

THE
Psychological Review

EDITED BY
J. MARK BALDWIN HOWARD C. WARREN
JOHNS HOPKINS UNIVERSITY AND PRINCETON UNIVERSITY
CHARLES H. JUDD, Yale University (*Editor of the Monograph Series*).

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THE PSYCHOLOGICAL REVIEW.

THE PSYCHOLOGY OF INTEREST (II.).

BY FELIX ARNOLD,
New York.

III.

It is seen from the above that interest is most generally considered as a feeling and that it is closely connected in some manner with attention. In this section I shall try definitely to establish the relation between interest and feeling, between interest and attention, and to show wherein interest itself consists.

First of all, is interest nothing more than a feeling of pleasure-pain? To make interest a feeling of this kind would be to establish an identity between interest and pleasure-pain. If this were so, then pleasure roused by an object would be interest in such object, and interest in it would likewise be pleasure in it, to take the positive aspect of the case. This, however, is by no means so. There may exist, for example, an interest for me in the preparations for dinner, but in the actual process of eating there would perhaps be a pleasure, but hardly an interest in the eating, *per se*. In the preparations I see good things to eat, pleasant company, an opportunity to expand and bring out my social worth, etc. In the process of eating as such, these various ideas become realized, producing pleasure. A rhythmic thrill of delight is felt in a present moment, is confined to the present, but if it has no other reference, it can have no interest. An object, perhaps displeasing in itself, but which is a means of producing such a thrill, will have an interest for me on that account. We are so used to consider everything of interest with which one is occupied, *that pleasure-pain as a self-sufficient*

means of stimulation seems to be overlooked. To take the illustration above, of eating. If the processes have in them no reference to some future condition, the interest nears its end, and the pleasure begins. There is then pleasure and nothing else. It is confined to, and ends in the present. As Baldwin says, "We would hardly say that an oyster is interested when a sharp instrument is thrust painfully between its shells. The intrusion affects him, and it is in his interest to avoid it; but it is truer to say that it hurts than that it interests him."¹ Where, as in secondary interest, there is an interest in some means because of their connection with a pleasurable or painful end, there need be no pleasure in the means at all times because of such connection. This would make life 'one long sweet dream.' We might say that interest is potential pleasure in that it may so end, but potential pleasure or pain is not the actual feeling. And a potential interest would be an interest which, when actually existing, would tend to realize a potential pleasure, this pleasure, however, being twice removed from the potential interest, and once from the interest as actually existing.

Pleasure-pain, however, is closely connected with interest from a genetic standpoint. Suppose a given situation, through difference, change or pleasure-pain, to produce in me a series of reactions to such situation. As the result of my experience with such situation, my reconstruction of such situation will take a certain form. The situation will mean to me the possibility of again reaching the condition which was reached in the first experience. It will be the means of my attaining a certain state which I have already experienced. As such it will have for me a certain interest. Ideally there will exist as the result of my reconstruction, a system of ideas, a mental disposition, which will act as a guide to my reaction in a similar situation, while at the same time there will be a tendency serially to go through the reactions which will produce the state or a similar state to the one experienced. If not through direct motor control, then through imitation of another who has gone through a similar process, my attitude will be directed to situations similar in kind. The situation and the objects concerned then point

¹*Feeling and Will*, p. 143.

beyond themselves, and acquire a value because of their connection with a future condition which is possible through them. Pleasure-pain may be a starting point, as may also instinctive reactions, but they are not on this account, interests, as such.

Similarly interest, though closely connected with attention, is not attention. Perhaps to bring this out it may be advisable to give briefly the state of affairs as present in a moment of attention. Control and development of any situation demands a fixation of the objects concerned, a narrowing of the field under manipulation, a more definite and accurate series of adjustments, a more refined reaction, a higher degree of delicacy in interpretation, a finer 'feel' or body attitude, in short, attention. Several aspects in attention may be pointed out, some of which have, at different times, been unduly emphasized. If we consider the given situation in its more objective aspect, we find an increase in the clearness and distinctness of the field. This gives us the '*Blickpunkt*' view of attention.¹ If on the other hand, we consider only the residual effects on the self-concerned, we find that there is developed a disposition or system of mental elements, which tend serially to realize themselves in moments of attention to objects connected with them. These ideation masses serve as reinforcing agents in the process.² The actual process of adjustment and control, the manipulation and working over of the various parts of the situation constitute the motor aspects of attention.³ Attention may therefore be defined as a process of adjustment and control, such adjustment and control in its advanced stages being guided by an ideational content and body attitude, resulting in a narrowing and illuminating of the field concerned.

¹ See Kant, *Anthropologie*, § 8, Wundt, *Grundzüge*, III., pp. 333-339, Jodl, *Lehrbuch*, III., p. 74, and Titchener, *Experimental Psychology*, I., Pt. II., p. 189.

² See Kohn, 'Zur Theorie der Aufmerksamkeit,' *Abhandlungen zur Philosophie und ihrer Geschichte*, 1895, and Bradley, 'Is There any Special Activity of Attention?' *Mind*, O. S., II, 1886, and 'On Active Attention,' *Mind*, N. S., II, 1902.

³ See Ribot, *The Psychology of Attention*, Münsterberg, *Beiträge*, Heft 2, p. 121; Lange, 'Beiträge zur Theorie der sinnlichen Aufmerksamkeit,' *Philosophische Studien*, 4, 1888, and Baldwin, *Mental Development*, Ch. XV. and Ch. X., Sec. 3.

The relation of interest to this process is one of concomitance only. The state of clearness is not the interest, nor is the actual process of motor control. Interest is rather what gives the moving impulse to the process in question; it is the means of determining whether or not such process be initiated. Or rather it is one of the means, the other being actual pleasure-pain or instinctive reaction. For example we may suppose a farmer and a hunter simultaneously watching a hawk. The attention may be equal in degree, but the interest is somewhat different in each case. The hunter takes a certain attitude, this attitude being determined by a certain ideational content. In so far as the situation points to the future there is interest. In so far as there is control in the present there is attention. The farmer takes another attitude and for a different reason, though his control may be of a similar nature to that of the hunter. The hunter sees in the hawk the possibility of bagging some game, of probable congratulations on his marksmanship, of a feeling of expansion due to success, and the like. The farmer sees in the hawk possible damage to his poultry, means of avoiding this, and the like. Both are equally attentive or may be. Each has a similar control of the situation. But the impelling interest in each is very different. It might be said that since both are interested in the same thing, their interests are the same. But the occasion of the interest is not the interest. The different meanings attached, the difference in the guiding ideational contents, would preclude such a possibility. We may also attend to the same thing, but the attention need not therefore be the same in each case. We can, however, suppose that the controls in each case are about alike, that there is an approximately equal narrowing and illuminating of the field in question. From the nature of the given illustration such a supposition can hardly be made as regards the interests concerned.

My object thus far has been rather negative; to show what interest is not; to emphasize the fact that it is incorrect to identify interest either with pleasure-pain on the one hand or with attention on the other. I shall now attempt more closely to deal with the aspects of interest as they exist in foundation situations, dealing with them as conative and as cognitive. I shall deal

with each aspect separately for convenience, though both are, in greater or less degree, always existent together.

When I am interested in anything, I take a certain attitude towards it. I have a tendency serially to realize a set of reactions which will give me a more or less perfect control of the situation, and which will result in a certain state, at present in a more or less ideal form. The object or objects concerned mean for me a certain condition of the self. If the object pleases and carries with it no future reference, there may be pleasure but no interest. In the latter case the striving for the realization of a future state has vanished; the interest has disappeared. To illustrate: I have before me a highly colored chromo, of the kind usually given away for soap coupons. *Horrible dictu*, I take some pleasure in looking at the combination of colors, at the action expressed, and the like. I have little interest in it, however, interest here being used in a technical sense. On the other hand, I turn my attention to a small dirty cardboard calendar having on it in small print all the months, and through some of the days of the month of July small black crosses made in pencil. I look at this with interest, it has interest for me, for on each of the days in question I hope to engage in certain pursuits, to meet certain people, to do certain things. I anticipate a certain future condition of the self in which I shall realize a certain thrill of pleasure. I take an attitude towards the calendar which is due to the significance it has in connection with a future state of the self. But I do not consider it a thing of beauty in itself, and when it has served its purpose I shall throw it away. Similar interest exists for a person in a railroad time-table. Pleasure exists for a child in going through a picture book. This is why so much of the illustration of books for children, and so much class-room decoration loses its full value. They have only the incentive of pleasure, without any accompanying interest. We cannot say that the interest is future pleasure, for the interest is now, it exists in the present, and is a fact, whereas the future pleasure is not, it is something which may may exist, but it has no present existence and therefore it is not. The idea of the future state may be present in a more or less dim form, and if so it is

something added to the attitude present, and serves to guide such attitude.

By feeling attitude I do not mean an attitude felt as pleasure-pain, or a feeling of pleasure-pain, as Stout does. The attitude which is taken is a gradual development and is the result of reactions in a given situation. When I see an object which is not connected with my former experiences, and which may or may not threaten danger, but which none the less disturbs me in some manner, I react towards it a certain way. I examine it, touch it, feel it, test it in a number of ways, go through a series of reactions. After I have on different occasions done this a number of times, I stamp the object or the situation as something to be treated a certain way. It acquires for me a certain meaning. Now, upon meeting with such object once more, if I do not go through the whole series of reactions I tend so to do. I take a certain body attitude which is felt, and which may be called a feeling attitude, conative tendency, or what not. If I wish to realize such implicit reactive series, if I wish to develop the meaning of the object concerned, I go through the entire process of serial reaction, in whole or in part. Whether the object is a word or a symbol, or a 'concrete' object, the same holds. Various objects have for me a certain worth, and the consciousness of such worth is the result not only of my personal experience through direct manipulation, but of whatever indirect experience streams in, from the school, the home, the social environment, and the like. All such indirect experience, of course, must be interpreted in terms of what I have actually undergone. I thus may take an attitude towards some ideal end which I feel is closely connected with my welfare, *i. e.*, I may tend to go through certain reactions in virtue of such ideal end. The meaning or felt worth of an object is simply consciousness of the attitude roused by such object. An object has worth because it 'hits' me a certain way, and I am accustomed to call an object 'of worth,' to stamp it with meaning when I am affected in such a manner. This feeling is due to the attitude taken, such attitude being the tendency to go through some reaction or series of reactions.

In interest, the attitude is not only the attitude caused by the

object *per se*, but it is something more. The object as such produces a tendency to go through a series of reactions which will give a more or less perfect motor control. *In addition, there is always a tendency serially to realize reactions which will arise when the future condition is reached, and to which the present situation is a means. It is this latter tendency and attitude which in a large degree determines the series of reactions in the attempted motor control. Such tendency is felt as striving, appetite, conation, as interest.*

Now the striving to have direction has with it a more or less definite cognitive element. The future condition in order to be realized must exist in some ideal form, as a mental disposition, a system of ideal elements, or simply as 'meaning' undifferentiated and inchoate. *This cognitive element may be present in very dim form, in fact may seem lost in the presentation existing, may exist only as a fringe, as a meaning in the given situation, as general awareness. Unless, however, some cognitive element is present, no future reference is possible and no interest can exist.* Interest on its cognitive side is the special signification which an object or idea has with reference to some future condition of the self, the special meaning in this connection which is attached. During the process of realization this ideal element may assume a serial arrangement, may become explicated in a series affording a guide to the reactions involved. *In a more advanced state the ideal element takes the form of a more or less definite system of ideas, such ideas being excited by the situation in question, and being necessary for more perfect motor control.*

'Reference to the self' may need some further explanation. Anything which is connected with me in any pleasure-pain relation has reference to me, is connected with my future welfare and to a great extent determines my future attitude. Take for example, the given situation in a man's business. With this are usually associated for example, 'building,' 'fixtures,' 'safe,' 'wares,' 'telephone' and the like. This however is the state of affairs as interpreted by a social average. Any business may have these various things. But A's business would mean to him in addition, 'food,' 'luxuries,' 'home,' 'ease,' etc., all

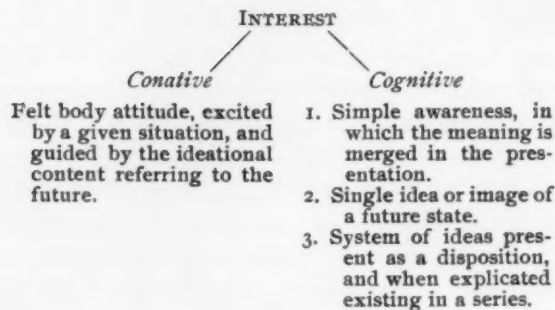
of which are to be enjoyed by *A*. If we take in *A*'s family as participants, we come back in the end to *A*. They enjoy the different things and in turn are enjoyed on the average by *A*. If *A* is working to feed the multitude, the interest existing must be connected with the self. *A*'s determining pleasure, satisfaction, feeling of expansion, of quiescence or what not would consist in seeing the multitude happy, or in seeing them not-miserable. This would determine his attitude. His interest on its cognitive side would be the meaning existing for him in the situation under control, in the ideas or systems of ideas determined thereby, the thoughts of the multitude in various states or reactions, of their happiness due to his kindness, of the opportunity they give him for social expansion, and the like. On the conative side would be the attitude caused by the situation as actually before him, and as mentally idealized. Were the self not concerned, *A* would probably let the multitude starve, as in fact he does (*i. e.*, *he* is all of us) when the situation is too far off, as in central Africa, or elsewhere. Altruism in the end reverts to the self, for we cannot abnegate nature. Selfish interest is so-called because only the self seems to be concerned. But as a matter of fact, 'disinterestedness' is nothing but a form of interest, an interest in which the various *socii* benefit. In fact it is the selfishness of these *socii*, a selfishness which sees only the benefit which accrues to *them*, and which neglects the feeling of the generous individual concerned, that stamps an act as disinterested. (The various *socii* are again, all of us.)

While in interest there may be the thought or the awareness of some state or reaction which is to be experienced by the self, and on account of which the self takes a certain attitude, it may also on its cognitive side be the thought or awareness of some state or reaction which is to be avoided by the self. For example, we may be interested in the movements of a rattlesnake, because such movements mean possible danger, a bite from the beast, pain from poisoning, and the like. We have a negative interest as it were. If merely a feeling of alarm is present, there is not interest, but simply feeling in the present. In the example given in the preceding paragraph, *A* was supposed to enjoy his

family. On the other hand he may hate them and still allow them to enjoy the fruits of his labor. In such a case he would have a negative interest as far as his family is concerned. *A* would see in his family the possibility of a disturbance of his social equilibrium, of dissatisfaction due to interference with his habitual method of living, of probable effort in readjustment should trouble come, and so on. As we usually say, *A* is, in such a case, interested in keeping the family peace. His attitude would be the tendency to avoid such a state of affairs, while the guiding aim would be the thought or awareness of the future state in question.

Any situation involving interest is thus seen to be connected with the future of the self concerned. Cut away all reference to the future and no interest is possible. Similarly remove all reference to the self and interest likewise will disappear. For example, a newly elected president of a rapid transit company is reported to have said, 'all the interest the people have in me is how much they are going to get for a nickel.' In this he was correct. The public were not concerned in him as an æsthetic production, as a pleasure-producing object. They were interested in him because they saw in him the possibility of influencing them in some more or less definite manner in the future.

Interest in general may be defined as *a body attitude, pointing ahead and to the future, such attitude tending towards serial explication under guidance of a concomitant ideational content, to which content it gives meaning. And by the series of tendencies or actual adjustments involved in the motor control of the situation concerned fuller meaning and wider content may be acquired. On its ideational side, the present moment need not be a single idea, but it may be an entire disposition, a more or less finished system, or on the contrary, simple awareness, fringe of meaning.* Given in outline we should have the following:



As an example we have, of the first case, a situation in which the future reference is merged in the presentation, in which it is present as simple awareness, *e. g.*, an individual observing the behavior of a spider constructing its web; of the second case a situation in which a more or less definite image or idea is present, *e. g.*, a little boy with the idea of a toy which he is to possess, and interested on that account in a task or bit of work; of the third, a situation in which an entire disposition is involved which disposition may become serially explicated; the higher type of mental activity directed to an end, *e. g.*, a general planning a battle, the end guiding the direction of thought. Of the various forms which interest takes the more important are desire, expectation and curiosity. Of the degrees of development in interest there are the stages of primary interest, secondary interest and acquired interest. The laws determining interest I shall reserve for the final paragraphs.¹

Most German psychologists consider will merely as a form of striving, a feeling of appetition, of '*Lust*' or '*Streben*' resulting in a volition. This is the state of affairs in desire. Desire

¹ The fact that *simple awareness* is a cognitive aspect which may have future reference has been overlooked by the Herbartians who deal only with ideas and systems of ideas. Another point may here be brought out. Where a series of ideas has no future reference, they may be 'pleasing' but they are not 'interesting.' In fact the person concerned does not take that attitude towards them, though an outside observer may consider the individual in a reverie, as 'interested.' Pastness need not shut out possibility of future reference, and in fact 'pastness' from a psychological standpoint is simply an aspect of the present. And where the aspect has future reference, interest exists, but where the future reference is absent no interest is possible. I have touched upon this aspect in the *PSYCHOLOGICAL BULLETIN* of November, 1905 (Vol. II., pp. 367-368).

is essentially teleological. We always strive towards something which is beyond our reach either *to gain an end, to reach a condition of pleasure, of expansion, of quiescence on the one hand, or to avoid a condition of pain, of depression or of strain on the other.* With reference to the former state of affairs we have a form of striving called appetite, with reference to the latter, aversion; but the striving is there none the less. If I possess that something, then it evidently is not necessary for me to strive towards it. Desire has in it to a high degree the conative tendency or feeling attitude, though there is a more or less definite cognitive content. In a simple case, when an object is before me but beyond my reach, that is, when I am unable to control it, I strive so to do. I desire the object, that is, I wish to realize some future condition of the self which has been experienced before. This feeling of striving is present more strongly than usual in the common forms of interest, and is felt as conative tendency, as impulse, as appetite or aversion. When I desire something which is to be controlled by me, subject to certain conditions, I set about to remove certain obstacles, to do something, or actively engage so to do. I am unable to realize an attitude, a condition, a future state only ideally existent, because of obstructions which prevent this ideal content from becoming a fact. Hence my feeling of desire persists and my efforts continue. The interest in such cases is the feeling of '*Streben*' plus the guiding and directing cognitive content, the conative aspect being the more prominent. When, however, the desire becomes so great as to overwhelm all future reference, and is felt simply as feeling in the present, the interest disappears, swamped in a flood of feeling. This often happens when a desire for a certain object becomes an end in itself, the object being entirely forgotten in the process. When I actively engage in the doing of what is necessary to bring me nearer to the future condition or the motor control ideally existing, I have the process of volition, and this volition is *in part* the interest, so long as the striving continues, until the end is reached.

In expectation there is an awareness or an image or an idea of something more or less known which is to affect us in a more or less definite manner and towards which in the present we take

an attitude. The conative and the cognitive elements balance about evenly. The future condition existing in the awareness or in some cognitive content influences my present condition rather strongly, but not to so great an extent as to drown out or to predominate over my present state. Where the 'something expected' is clearly known, my attitude towards this future state or control may be rather definite and constant, the expectation becoming realized on the arrival of the future moment with all that it has for me. Where the 'something expected' is not so definitely known, imagination supplies what is needed, guided, if necessary, by the existing situation, aspects of the situation, etc., whether ideal or real. For example, a hunter in a forest on the watch for game may expect something, he is not quite sure what; but his cognition of this 'something' is more or less conditioned by his surroundings, etc. He will hardly expect elephants if in Canada, or polar bears if in Florida. Interest is evidently present, for we have the attitude towards some future state of the self which is to be realized, and a guiding cognitive content.

Expectation and desire both refer to the future, have in them each a strong conative attitude, and as such are forms of interest. They may, however, be differentiated. In expectation, the only obstruction to the realization of my future state is either time, or the action or non-action of some other person. Expectation is essentially a static aspect of the situation as far as I am concerned. I cannot struggle; I can do nothing to bring about this realization more quickly, *as expectant*; I may set about to influence the other determining individual, or read to kill time, but this has nothing to do with the expectation *per se* and as a *felt moment of interest*. In desire, on the contrary, there is an active struggle to remove the obstacles to the realization of the future state, a more or less strenuous reaction. Desire is rather a dynamic aspect of the situation as far as the self is concerned. Desire must not be confused with mere 'wish.' In desire the feeling-attitude is emphasized at the expense of the cognitive elements, and may at times even suppress the latter. In this latter case it becomes simply a present feeling.

Where interest exists in a situation more or less known and

when we do not know exactly in what way such situation will affect us, we imagine from our past experience how it *might* influence us, what future state *may* be produced. Such interest is curiosity. Curiosity, therefore, consists in an attitude determined by a cognitive content excited by a partially unknown situation, for the purpose of securing more perfect control of the situation in question. We desire further knowledge that better reaction and control be possible. The self is concerned, an attitude is taken because of the influence which the present situation may have on the future. Interest is present. The relation of the partially unknown object or situation to our future welfare is not sufficiently known, hence the object or situation possesses an interest for us, a tentative interest, as it were. Such interest becomes a more or less permanent one when the actual signification of the object for the future condition of the self becomes more fully known. Such tentative interest disappears when further reaction and knowledge show that no or little reference to the self is present, or when the curiosity becomes satisfied, *i. e.*, when the ideal state becomes realized. Novelty may cause curiosity, but it is neither the curiosity nor the interest. Curiosity is therefore an interest of a certain kind, a tentative interest, as has been said. When the relation between the self and the object or situation becomes more fully known, the interest either becomes a more or less permanent one, or else it disappears altogether. That is why curiosity is such a dangerous incentive to appeal to in teaching. It may run down like a clock without becoming fastened more permanently. The end must be shown to be worth striving for again, if interest is to persist. Curiosity about fits Stumpf's '*Lust am Bemerken*,' though it seems incorrect to confine interest to this alone.

Curiosity may be differentiated from expectation, though they have some features in common. In curiosity there is a definite situation before me, to which I take an attitude, because of a supposed significance for me. In expectation there is no actual object present; it is ideal in form and is to exist. The situation which is to influence me and which I expect will exist some time in the future exists for me only as a mental con-

struction. In curiosity the situation which is to influence me is actually before me, but its full significance remains for me partially unknown. In curiosity there is a definite starting point about which revived meaning, images, etc., cluster, while in expectation the revived images or ideas of the situation to be realized exist first and form the starting point for any further ideal revival or control. In expectation the situation is to come, in curiosity it is already partially present and becomes subject to our control for more perfect control.

'Rouse interest in a person and attention will follow' is a more or less popular opinion, and much used in so-called pedagogical discussion, though more up-to-date books on pedagogy follow the doctrine of concomitance. Exact analysis will show that interest as actually present is concomitant with attention, in fact is the incentive to the motor control involved in attention. Interest and attention, except in most elementary and primitive forms of attention, run side by side. The moment we see in an object some special meaning, as soon as we take an attitude because of such signification, motor control becomes necessary for further development of this meaning and attitude. The incentive present, further differentiation and control of the situation is begun, and we have interest on the one side and attention on the other. *In the blind manipulations of the infant, in the aimless working over of a situation by the newly-born child (or as soon after as he is capable of this), the very first control involves no interest to the infant, though to an observer it might seem so to do. Only after the manipulation has resulted in a certain condition of the self, that is, only after the situation has acquired a meaning can interest exist.* Efforts towards control and instinctive reaction are determined by levels below the stage even of awareness. To consider interest present in this stage would be to posit ready-made adjustments and attitudes *as felt*, and innate meaning for the child on the one hand; or on the other hand, it would deny that such instinctive reactions are acts of attention, in that they are below the conscious levels. But in instinctive reactions of this kind, at least the visual elements, etc., are conscious ones, and these visual elements, etc., acquire meaning only *after the process*

of control has resulted in a certain state of the self concerned. Development of interest is the process by which instinctive reactions lead to control, such control resulting in a certain condition of the self. The situation giving rise to this condition may then possess interest, but only after the motor control has taken place. The child (and where can we find it?) which is born with cognitive elements giving meaning to situations to which it never reacted, may have interest in its first attempts at motor control. But the child which instinctively seeks motor control, because of innate impulses within it, acquires interest only after such control has taken place. Or in other words, *meaning is an acquired thing, is due to motor control, and comes after motor control.* As such, interest does not exist in acts of attention purely instinctive. Of course such naïve states are few and far between in more advanced conscious life, but the point I wish to make is that they exist and must exist at some stage in the process, unless as I have said before, we are to posit ready-made attitudes, innate cognitive elements, 'instinctive' meaning. This is a small matter for the psychology of interest, but it is weighty with importance for the teacher, who deals almost entirely with motor control. Granted ready-made interest *on all occasions*, and teaching becomes one long sweet dream, which it is not by any means to the best of the teaching body. We may represent the relation of concomitance between interest and attention in the following schematic outline:

INTEREST.	ATTENTION.
<i>Conative.</i>	<i>Conative.</i>
Felt body-attitude, tending serially to realize a <i>future</i> situation.	Body adjustments for more perfect motor control, with feelings of strain.
<i>Cognitive.</i>	<i>Cognitive.</i>
Mental construction of the situation to be realized, existing as fringe of meaning, simple awareness, or as free ideation.	Ideal elements reinforcing and guiding motor control through fusion with, assimilation of, complication or association with impression or idea.
<i>Subjective.</i>	<i>Objective.</i>
Possible feeling due to anticipation, to a partially revived body thrill.	Clearness, distinctness, vividness, persistence of the situation.

Where, however, interest may be said to exist before attention is in the case of potential interest. Such interest, however, exists in advance of attention, *only as potential*. The moment attention exists, such interest becomes actual and is then concomitant with attention. Where we have a mental disposition favorable to the reception of an impression, and where such disposition points to the future of the self concerned, there we have the cognitive element of an interest which becomes actual when the attitude is taken. But there is no real interest until the whole system, impression, plus ideal revival, plus attitude is a fact. In potential interest we have interest before attention, but such interest is only potential. It may be said that such potential interest is concomitant with potential attention, and when realized, with real attention. Where, however, there is no actual interest present, where mental construction has not yet taken place, where meaning is attached to an object only during the process of motor control, there we have interest concomitant with attention and not before it as is sometimes loosely said. It is the incorrect identification of interest with feeling or with instinct which brings about the notion that interest may exist before attention.

The simplest form of interest is that in which motor control of a situation has given the situation meaning in itself, in which, therefore, the situation is looked upon as a direct and possible means of affecting the self in the future. Whether the object *per se* be tinged with negative or positive feeling does not affect the interest as such, since this interest is the meaning the object has for our future welfare, the attitude roused by the awareness or thought of such welfare. An ugly looking case may rouse in me no interest. But if I know or suspect that it contains some things for which I have sent, and which I can use, it becomes for me an object of interest. My attitude is taken because the case and contents mean the possibility of passing some agreeable hours, and the like. So too, a rattlesnake as such, *e. g.*, in a cage and apart from its possible action on me, may be a very pleasing object. I may admire its graceful movements, its sudden darts against the glass, etc. But place it before me on the highway and it becomes fraught with meaning.

It will then have for me a negative interest in so far as it means to me a possible danger, etc., as above described. In addition to the interest, certain feelings may or may not be present, as those of alarm, excitement, tension, and so on, but these, being merely present as concomitant phenomena, do not constitute the interest. Interest of this kind may be called primary interest, in that the object or situation itself, and without any other connections, will lead to the future state idealized in awareness or thought.

As more often is the case, however, the given situation to be reached, and the object or objects through which this is directly possible are not present, cannot be manipulated at once, are not directly amenable to the motor control necessary to realize the future condition ideally existent. It is at this stage that mental construction enters. Aspects of the objects concerned, possible connections with them and leading to them are imagined or thought out, the awareness or image or idea of the object needed becomes developed and assumes numerous ramifications which are further developed till they connect in some manner with the motor control directly possible. The original awareness assumes a more definite shape (if only awareness is at first present), there is consciously developed the image or idea of the end situation to be reached, and from this end stream the various explications connected with the present, for it is only from the present that motor control can start. In such a case the end to be attained is similar in function to the object in primary interest, but it is only a step removed from the final realization, and is only ideally existent. In primary interest, some object or situation, *A*, leads to the realization of the interest immediately and directly. In the more developed state which we may call secondary interest, *A'* is some end to be realized, and this is connected ideally with a series of means over which control is necessary before the terminal situation can become a factor. In this case *b* leads to the end *A'* and *A'* leads to the realization of the interest. The interest exists in *A'* and is the moving force, the impelling motive for control of *b*. In this manner we may have a whole series of connections, in which *c* leads to *b* and *b* to *A'*. The interest in *c*, *b*, etc., up to the one preceding ultimate realization is

secondary interest in that it is derived from the interest in the original situation which is to become subject to motor control. A student, for example, may be interested in psychology. If psychology means for such a person, on the first reading, possible intellectual enjoyment, feelings of expansion, of satisfaction and the like, such interest would be either primary, or, as will be explained, acquired. But the interest in psychology may be secondary. The interests for the student may be of the following kind: He may see in psychology the possibility of passing some examination; such examination may mean the possession of a certificate or of a degree; such degree may mean a position in a high school, college, etc.; and then this position may mean probably the possession of money, of a position, of a name, and the like; or there may be still higher aims. And during the existence of the secondary interest, the final aim gives power to its means, *which do not so much lead up to the end, but which rather have been developed out of the end*. Secondary interest may be defined as an interest existent in a means or a series of means which have been developed from a terminal situation or the image or idea of such situation, and which means or series of means have interest only because motor control over them is necessary before the terminal situation can be realized. The impelling force exists in the interest in the final situation out of which the means have been developed.

In the course of the various processes leading to final realization, none of the means may have pleasure *per se*; in fact, as is usually the case in many instances, the means are more or less repelling and have interest only as secondary, as a means to what is to come. During the process, however, a residual modification of the self may lead to greater possibilities for expansion, for enjoyment, for development, which at first were not seen as inherent in the means. *There may be developed what has been called an increment of power due to possession*. There may be developed on the cognitive side an apperceptive basis which can be used in interpreting and controlling situations before outside of the activities of the self concerned. Most of the interests, in fact, I may say all the important interests seem to have been developed in this manner. Insofar as they are the

product of man they may perhaps be stamped as artificial, but insofar as man is a part of nature such interests are just as natural as is the rest of man's development. But they can hardly be called primitive. Acquired interest (this seems to me to be the best name), is that attitude and determining cognitive content which is a residual development of secondary interest. Acquired interest differs from primary interest in that it is the result of secondary interest, being constituted by the residua of the latter, as it were, while primary interest is the result of direct motor control.

Interest as thus conceived does not exist in acts of instinctive attention, as I have already tried to show. In instinctive attention there is a feeling of pleasure-pain, etc., but no interest. Interest is present only in the more or less advanced stages of attention, and is built up of the residua of many processes of instinctive motor control. Since interest has on its cognitive side simple awareness or ideal construction, that is, some sort of meaning, it is evident that the interest must, to a large extent, be dependent upon such cognitive content. Interest as a general power can therefore never exist. I can not develop an interest in study, work, etc., but only in those kinds of study, work, etc., which have meaning for me, are connected in some manner with some future condition of myself. Only insofar as a number of such cognitive contents have features in common can we have interests in common. The widest possible kind of interest seems to be that in which the content is some aspect of motor control, and the feeling to be realized a sense of satisfaction, a feeling of expansion and the like. That is one reason why manual training is so valuable an instrument in education. General control through the fingers, *e. g.*, cutting, painting, hammering, sewing, analytic and synthetic manual space perception and the like have an extremely wide applicability. And control in most of our daily life and daily actions is just the sort of motor control developed by the manual arts. I think it safe to say that for the few times one needs to find the square root of a number over a thousand, or to know a rule in grammar or a date in history, one will have used his fingers hundreds of times in various acts, be such acts merely grabbing firmly the

handrail of a car in motion, or quietly arranging the material in a business house or dwelling. In addition most of the meaning the various cognitive elements and situations acquire, is acquired just through this motor control.¹ The range of the interest concerned depends, therefore, upon the guiding cognitive content, and is general only as the content is general. Power of interest means nothing till connected with a content, and then its generality depends upon the generality of the content in question. It becomes a question, therefore, whether it is good as pedagogues claim, to develop an interest solely in the subject *per se*; or whether it is not better to cultivate an interest in some more general end, as virtuous possession of money (and I name this without blushing), possession of social good will, an idea to be somebody of use to the community, and the like, which can then be applied and connected with any number of studies, occupations, etc. Such an end is by no means abstract, and when developed will be connected with some means. This is why, to a great extent, so many newcomers prosper in our land. They are filled with one ambition, have one aim, to own land, get money, possess ease and the like, which they connect with whatever occupation or study affords the nearest and surest road to success. To return, the dogma of formal discipline goes to pieces with interest as elsewhere, and the interest is as restricted as the end in question. Only as the study or the work expands can the interest do likewise.

I shall end my discussion with a treatment of the laws which govern both the formation of interest and the use of such interest when formed. This portion of the paper will probably be of greatest use to the teacher, or it ought to be of use if the points thus far brought out mean anything. There are two phases of the question where the use and applicability of interest are concerned. In the first place there is the question as to the laws underlying the *development* of the interest, and in the second place there is the question as to how, once such interest is

¹See Binet, 'Perceptions d'Enfants,' *Revue Philosophique*, 1890; Shaw, 'The Employment of Motor Activities in Teaching,' *Popular Science Monthly*, Vol. 50, and 'A Comparative Study of Children's Interests,' *Child Study Monthly*, Vol. 2; Barnes, 'A Study on Children's Interests,' *Studies in Education*, 1897.

present, to make the most *use* of this interest. In examining these phases of the situations concerned I make use of ground which has been thoroughly ploughed by others, and hope simply to enforce what others have already presented.¹

I shall discuss the laws underlying the development and the use of interest under the following heads:

1. *The law of expression and motor control.*
2. *The law of imitation.*
3. *The law of habit.*
4. *The law of appetition towards a situation producing feelings of*
 - (a) *pleasure.*
 - (b) *expansion.*
 - (c) *quiescence.*
5. *The law of aversion from a situation producing feelings of*
 - (a) *pain.*
 - (b) *depression.*
 - (c) *strain.*
6. *The law of apperception (concerned in the use of interest).*

It is evident that any given situation can acquire meaning for the individual only as the individual comes in contact with such situation, reacts towards it, manipulates it, attempts a more or less perfect motor control. *And the basis for such reactions is the impulses which exist in the individual concerned.* Given a situation present to the child, and he instinctively *shoots off* as it were in a definite manner without forethought, without awareness of meaning or cognition of the result. An infant will just as readily tear up a ten-dollar bill as a newspaper, will just as soon swallow cyanide of potassium as a lump of sugar. The result of his reaction, of his adjustment, of his attempted control will determine the meaning of the situation when again presented (if the child of course is still alive) will give the foundation of a primary interest. The state reached after such control will determine future reaction in the individual. In teaching,

¹ See Baldwin, *Feeling and Will*, Ch. VII., and *Mental Development*, the whole book. The notion of *motor control*, and the more exact presentation of *means and end* I have taken bodily from Dewey whose lectures on kindred topics are illuminating, though rather abstract.

the question is to determine what objects will be presented, so as to produce the highest possible degree of pleasure, expansion or quiescence compatible with the end sought. No direction is needed where spontaneous expression or motor control are relied upon to develop the interest. Selection of subject matter only is here the problem for the teacher. The use of the sand heap, of clay, of stories told *by the children*, etc., all come under this law. The feelings of satisfaction, of expansion, etc., after such processes have been gone through will be sufficient to stamp the objects or situations as worth manipulating, *i. e.*, they will acquire a fringe of meaning for the child (be he old or young) and as such will have interest. Furthermore, interest will be strengthened if the social appeal is used to rouse pleasure, expansion, etc., in the individual concerned. When this control is sought only for the sake of the approbation from others, or for a little black mark in a book, the interest becomes secondary, and in this case, perverted.

More often, spontaneous control is aided by a copy set for guidance before the control is attempted. The impression, image or idea thus first presented will, by the law of dynamogenesis, tend to work itself out in action, and we have the law of imitation operating. Imitation is the most potent factor in the development of interest. It is to be noted that the ideal copy existing may be merged in the presentation existant, *may be present only in the fringe of meaning in the object or situation, as simple awareness*. If, for example, a teacher finds the center of gravity of a ruler, makes a dent at the point and twirls it around on a pencil point, the pupils will do the same, without any other stimulation. The pleasure, etc., resulting will give meaning to the process, will determine the attitude to the situation, will result in interest. If again a mark, some artificial sign, social approval, etc., are given, these aid in strengthening the interest formed. Where further meaning is given through diagraming, drawing, coloring, illustration, etc., the interest is likewise strengthened; *but some sort of expression or motor control should be the basis*. The entire range of instincts and impulses (*which are not interests*) may be appealed to in the process. In order of vividness, the copies set may be, (1)

actual control of an actual situation, (2) actual control of a similar situation, (3) representation of the control, (a) by photograph or colored picture, (b) by simplified illustration, (c) by schematic outline, (d) by oral explanation and gesture, (e) by writing and print. The last usually accompanies the others, as does sometimes the fourth mentioned, (d). As examples of these forms of 'copy' set, we have of (1) actual gardening in a real garden. making of a real chair, speaking of a correct sentence, etc., by the teacher or one able so to do; of (2), gardening for example, in a soap-box, making a chair in miniature or in paper, giving a sentence in writing, to be spoken, etc.; of (3), (a), the usual pictures of gardening in the geography, the pictures in an 'Everybody's Book,' the pronouncing of words like those to be used, etc.; of (b) unfilled drawings of the processes in gardening, outline representations, etc., and use of words simpler than those to be spoken, etc.; of (c) schematic outlines of the process involved, and in speaking, phonic analysis, use of rules (may they rest in peace), and the like; (d) *oral explanation and gestures are almost useless in many of the school subjects, unless they come from the children concerned or unless they are called in as auxiliary*; with more advanced students they form a more important medium of instruction; (e) book instruction should, with children, come last of all if it is to be used at all. The set 'book lesson' is an instrument of torture which only the least capable instructors of children use. With advanced students the text-book is of the greatest use, and with many, it usurps the place of the instructor. *But the foundation elements are not obtained by this means.*

The outline as thus given is suggestive only and by no means complete. I wish solely to emphasize the importance of the process of imitation in the formation of interest, and the necessity of the right kind of 'copy' set.

It is to be noted that such copy set may appeal to an already developed interest of curiosity, but is of little value unless the actual process is attempted by the self concerned. The interest to be developed is not the interest of curiosity, the interest of the idle who like to 'nose' around, but rather an interest in some creative control. The interest of curiosity is an elementary stage which should lead to more active expression.

It is generally understood that habit deadens interest, that conscious meaning becomes less and less as the process becomes more and more automatic.¹ Habit no less than instinct is more or less mechanical and as such is not interest. It is not this negative phase of interest which I wish to bring out, but rather the means of utilizing just this automatic nature in the formation and development of a new interest. Where a situation of a certain kind always produces response of a definite order, the content of the situation may be somewhat different, and through the mere force of habit motor control will be started. After such control the situation with the changed content may contain possibilities which result in interest. The usual habit of response which can be used is of the motor kind. If, for example, I have the habit of taking a book and looking through it from mere force of habit, progressive control may lead in the growth of a new interest. So, too, in a school room, a teacher may start a process of control in the children merely by giving an order to proceed a certain way. It seems that habit of reaction is determined by a certain objective form which may be filled with a number of contents. The student who goes to college day after day reacts to certain objective features, *e. g.*, the horse or trolley car, the building, the seats, etc. Once there, further processes may lead to new interests, or development of old ones. The use of habit however is of a secondary nature and should be used more as a reinforcing agent.

By the psychologist's fallacy, the feelings of pleasure-pain, etc., which find their greatest value when they come *after* control of a situation, are sometimes placed *before* by the teacher who arbitrarily creates standards of value according to his or her whim or caprice. But where an impossible or useless course of study is forced down a teacher's throat, or where conditions forbid (*e. g.*, the 'big-class, cage-seat, silent-room and ramrod' system), he or she is justified, I think, in creating artificial values, *e. g.*, marks, punishment, driving, etc., if for self-protection only. The importance of the feelings given under the law of appétition and the law of aversion is self-evident. This calls for all those aids which will intensify the natural result of

¹ See Baldwin, *Feeling and Will*, p. 141.

a proper motor control, *e. g.*, social appeal, dynamic coloring of objects used in control, sympathetic atmosphere, æsthetic surroundings, and the like.

The laws above given deal with the development of an interest or system of interests; they are not the result of an interest or system of interests which is appealed to, but they are principles which govern the acquiring of interests. Once these interests are on a fair way of development, any appeal to them will be for the purpose of their further expansion and development, and can be roused only by connecting with them in some manner the situation or some aspect of the situation in hand. Apperception here lies at the basis of the process, and the related known becomes important in such stimulation. It is seen, or should be seen from the discussion thus far, that the Herbartians deal only with the *use of interests already existent*, and with the *necessity* of developing such interests, but the actual processes involved, and the underlying laws are neglected. This is why the theory of interest is so exasperating to the teacher, who usually scoffs at it as mere 'theory.' Interest is not a mere tickling of the sensations for the purpose of rousing attention in the children and of making life easy for the teacher. It is, as Volkmann has said, a more enduring thing. Interest is rather a manner of interpreting and reacting.¹

INTEREST.		
<i>Aspects.</i>	<i>Kinds.</i>	<i>Stages.</i>
Conative.	Desire (Will).	Primary.
Cognitive.	Expectation.	Secondary.
	Curiosity.	Acquired.
<i>Concomitants.</i>	<i>Laws.</i>	
Attention.	Spontaneous expression and motor control.	
Apperception.	Imitation.	
Possible feeling present or revived.	Habit.	
	Appetition and aversion.	
	Apperception.	

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¹ On apperception see Stout, *Analytic Psychology*, II., Ch. VIII., and Lipps, *Einheiten und Relationen, Eine Skizze zur Psychologie der Apperception*, 1902.

In the diagrams in sections I. and II. — means 'concomitant with' and = means 'equal to.' For purposes of reference, I append an outline of the main points taken up in section III. of the above paper.

ON THE ANALYSIS OF THE MEMORY CON-
SCIOUSNESS: A STUDY IN THE MENTAL
IMAGERY AND MEMORY OF MEAN-
INGLESS VISUAL FORMS.

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A. THE PROBLEM AND THE EXPERIMENT.

The general purpose of this study has been to contribute something to the analysis of the memory consciousness. Its more special efforts, however, have taken two more definite directions. (1) To determine the nature of the imagery in the recall of a given material. (2) To determine the nature of memory errors and the causes that produce them. Its general

aim, therefore, differs from practically all previous memory studies in that no attempt was made to study the quantitative aspect of memory, the question as to how much can be remembered, and the conditions upon which that amount depends. At the same time no claim can be made for entire originality in either its purpose or in its methods. The need of the investigation of both these problems had been urged already by Kennedy in his review of the methods and results of experimental studies of memory.¹ Since his writing, one phase of the former problem has been definitely attacked by Angell and Harwood,² Bentley,³ Whipple,⁴ and Schumann.⁵ Perhaps some of the earlier studies and discussions on the nature of the recognitive elements in the memory consciousness should also be mentioned in this connection. All of these studies, however, were limited to the *recognitive* consciousness, with the interest centralized further on the part the image of the first stimulus plays in the recognition of the second. Angell and Harwood's results were mostly objective. From the difference in the number of right and wrong judgments on the pitch of the second clang, given with and without distraction between the first and second clangs, they infer as to the possible influence a memory image of the first clang could have had on the judgment of the pitch of the second. Schumann's study is more of the nature of a general argument in which introspective observations are not quoted with much detail. To my knowledge, Bentley, and Whipple are the only authors, so far, who have seriously attempted to study the problem introspectively and who have at the same time adequately recognized the need of applying this method rigidly to the more general problem of the analysis of the memory consciousness. The second problem stated, the causes that produce memory errors, has not been directly attacked in any extended study.

¹ 'On the Experimental Investigation of Memory,' *PSYCH. REV.*, 1898.

² 'Experiments on Discrimination of Clangs for Different Intervals of Time,' *Am. Journ. Psych.*, 1899 and 1900.

³ 'The Memory Image and its Qualitative Fidelity,' *Am. Journ. Psych.*, 1899.

⁴ 'An Analytic Study of the Memory Image and the Process of Judgment in the Discrimination of Clangs and Tones,' *Am. Journ. Psych.*, 1901 and 1902.

⁵ 'Beiträge zur Analyse der Gesichtswahrnehmungen. Dritte Abhandlung. Der Successivvergleich.' *Zeitschr. f. Psychol. u. Physiol. d. Sin.*, Bd. 30, 1902.

Considerable recent work has appeared on its quantitative aspect, the degree of memory error and some of the objective conditions under which it occurs. This is the central interest of the studies by Stern and his co-workers to whose results the *Beiträge zur Psychologie der Aussage*, the second volume of which is now current, is devoted. The objective results of the quantitative studies on how much can be remembered have incidentally thrown some light on the analysis of the memory consciousness. In quite the same way the studies by Stern and others throw some light on the causes of memory error.

The present study is most closely related to those of Bentley and Whipple, having in common with them, in the first place, the introspective method of study. The first problem stated above differs from theirs in being that of the analysis of the memory consciousness in the recall of a stimulus, instead of that of the memory consciousness in the recognition of a stimulus given a second time. The same stimulus was never repeated. A group of meaningless visual forms, five to nine in a group, was presented to the subject for ten minutes, and once only. Immediately afterwards, and again after a number of different intervals of from two to ninety days the subject was requested to recall the forms, giving as detailed an introspective account as possible of the nature of the imagery, the process of recall and recognition, etc. He was also requested each time to draw the forms thus from memory as accurately as he could. The forms were not equally meaningless, but were so constructed as to allow of a classification into three classes, viz., the altered familiar geometrical form, the continuous irregular curve, being the most meaningless, and the several-part form of simple straight and curved lines. With this procedure the results are of two kinds. The introspective notes give the direct evidence on the first problem, and are supplemented only a little by the objective drawings. The drawings constitute the main results on the second problem, and, from the nature of the problem, can furnish only indirect evidence. The subject not knowing the errors he made in recall could have nothing to say as to their causes. These must be inferred from the data at hand. But the introspective results supplement the drawings to such a de-

gree as to make the inferences perfectly evident in most cases.

B. ANALYSIS OF THE RESULTS.

1. *The Subjects' Methods of Learning the Material.*—Before considering the nature of the imagery in recall it will be well to take account first of the subjects' methods of learning the material. This will throw considerable light upon the later results concerning the nature of the imagery. By alternately trying to learn and then trying to recall the forms during the ten minutes in which a group was presented the subject at once found that the forms were not equally difficult, and much more time was then put on learning the hard ones. The methods employed in impressing the various characteristics of the forms on the mind may be classed into direct methods, and certain aids to these that were used. Under the direct come then, first, merely looking at the forms and noting their details visually, and second, motor processes of the eyes following out the forms and also of the hand tracing them. To these the aids were associations made with individual forms or their parts and verbal descriptions. The direct methods need no further consideration. The use of the aids may be further described. In every case the subject consciously sought for associations, and the question, 'What is this form like?' or its equivalent, was probably always present in the subject's mind. They were sought for as a means of fixing the memory of the form as a whole. This search ended, in the different instances, in a variety of results. The outcome might be successful in an actual association made. Secondly, an actual association might fail while yet the form attained a familiarity that it did not at first possess. In these instances the form would be regarded as something familiar and known; it would 'look like something they knew, but they could not tell what.' Thirdly, in some cases the form was broken up into parts which were learned and recalled in a definite order. These parts had an evident definite individuality which made them parts and thus, it seems, must have had some sort of meaning for the subjects. But it was not so regarded by them. They denied all associations and familiarity in these cases. Fourthly, the form might, of course,

remain entirely meaningless and unanalyzed into parts. The effect of an association made or of an associated familiarity was always that of putting the subject more at ease with reference to the form in question; it made the form easy, and with this much accomplished he would leave it, feeling satisfied that he could recall it when wanted. The verbal descriptions were made mainly for the purpose of fixing minor details of the forms. They were used for the alterations in the familiar geometrical forms, for the difference between the actual form and its association, and sometimes for the whole of a form that remained entirely meaningless. In the last case the description was that of a general characteristic with the same function as that of an association with the form as a whole. The minor details thus fixed in memory by description were further, relations, positions, proportions and sizes of parts, the angle a part made with another, the position of a meeting or crossing point and of endings of lines, the nature of a particular curve, length of lines, etc. No particular attention was as a rule given to sizes. When sizes were specially attended to the total amount and proportion of the page the forms took up might be noted, and to remember the particular size of each form that of one might be fixed and the relative sizes of the others noted. For this descriptive aids were usually used. Positions were fixed in memory by imagining the forms arranged on certain lines. Such lines were made use of in every case. They were so drawn through the forms as to make familiar forms themselves, and were dealt with in the same way as the forms they located.

2. *General Analysis of the Nature of the Imagery and of the Process of Recall.* — In considering the results of this section it will be helpful to keep in mind the fact that in order to draw the form again just as it had been seen in the original the immediate thing, the only thing really necessary was a correct visual image of the form. All the rest could come in only as a means of getting that visual image, and of recognizing it as the correct one. I shall attempt first a general analysis, disregarding for the present two large factors that were found to influence the nature of the imagery, viz., the nature of the form to be recalled and the time elapsed since the last. In this I shall

consider in order the visual imagery, the associations, the verbal descriptions and the motor impulses, and describe their nature and relations when a definite recall is the result.

(a) *The Visual Imagery.*—After the first sitting the subject never imaged the forms in the color of the original. In most cases he was quite unaware of the fact that the originals had been in white on black. Generally they were described as colorless when questioned on this point, or that the color in the image had never been noted. Undoubtedly this was due to the fact that no demand was made on the subject to remember colors. In some cases the subject visualized the page in proper size and form and the different forms would then be visually located on it. But quite as often perhaps the group as a whole was described as being visualized 'off in space,' or 'off at reading distance,' with no particular consciousness of the relations of forms to the page. Whatever the nature of the visual was in this respect probably depended mostly on whether or not the subject specially related one or more of the forms to the edges or other portion of the page as a means of remembering its relative or absolute position. Some sort of a visual representation of its position was the most frequent immediate antecedent to the visual image. In those cases in which the recall took place with the aid of an associated name or equivalent, the association generally followed the idea of the position of the form with which it was connected. Thus the subject nearly always stated that he knew where the form belonged before he had any further clue to its recall, and only several instances out of about a thousand are recorded where the form was recalled without a memory of its position preceding. With this much given, several grades of spontaneity of the visual image of the form itself might be described. Beginning with the most spontaneous are the cases in which the visual of the whole form comes out in a flash as soon as the recall is attempted, and in such completeness of detail as to seem absolutely perfect to the subject at once. Next in spontaneity are the images that show a distinct course of development. According to the nature of the form, it may come up in parts with time intervals between the visual recall of the different parts, or

it may develop gradually and evenly from one end to the other. A third class are those in which there is a considerable interval between the visual image of its general position and that of the form proper. The subject knows where the form belongs, but there follows some time before he gets a complete visual image of it. That interval may be entirely blank as far as any clue to recall goes, or it may be filled with one or more of such aids, visual, or in other terms. Recall with the presence of such an interval was the most common form. A fourth class was frequently noted. In these the attitude with which the subject approached the form was also characteristic. When the subject felt assured at once that he would have no trouble at all in recalling the form, he would not stop to get a complete visual image of it before he began to draw. The image would then develop part by part or in a continuous manner as he drew it, running a little ahead of the drawing. The character of the visual image varied also with reference to the ways in which the recognitive consciousness entered. The memory sanction might come in at once with a ready and complete appearance of the visual image. Or, the image might develop in wrong directions, more or less similar, that would be at once recognized as wrong. Sometimes the subject would state that he purposely tried on a number of different images to see which seemed most correct. Closely related cases were those in which the form was drawn from a tentative image and its correctness or wrongness recognized only after the drawing. This was a very common procedure throughout, and occurred especially with difficult forms and in the latter recalls. The subject might fail to decide whether a form as visualized was correct until he could actually see it on paper, when recognition might be quite prompt and decisive.

(b) *Uses Associations and Verbal Descriptions have in Common.* — The associations and verbal descriptions that were made have several things in common which may be noted before considering them separately. In the first place, both were used as aids to the recall of the visual image. When the direct recall of the visual failed the recall of an association or verbal description made at once sufficed to produce the visual image sought

for. Secondly, associations and verbal descriptions might come in after the visual had already appeared. In these cases they might reinforce the recognitive sanction of the visual image. They would come in to verify the visual, and the subject would then feel doubly assured of its correctness. Thirdly, either or both might follow the visual image without adding anything to the recall or affecting the recognitive state. They would then be regarded by the subject as a useless addition to the total process which might have once served its purpose but was now of no further value. Finally, both might be so very closely bound up with the visual, and be of so incipient a character as to make it impossible to decide certain aspects of their relations from introspection. The statement that the subject does not know whether the visual preceded or followed association or verbal description, that he does not know whether the latter were present at all or not in recall, or what use was made of them if they were present, occurs very frequently in the notes. In harmony with this is the very common observation that they were much in the background of consciousness, with the visual as the prominent and main process. This does not mean, however, that there were not plenty of instances in which these relations and the use made of the associations and verbal descriptions were perfectly clear to the subject. We may consider the associations and the verbal descriptions separately now very briefly.

(c) *The Characteristics of Associations.* — Several forms of associations and grades of closeness of connection with the visual image of the form can be made out. The association might be in the form of a visual image of the associated thing. There was then a real duality of visual imagery, and the name of the associated thing might not come in at all. But more usually the connection was closer than this. There would not be two visual images, that of the associated thing serving as a cue to the recall of the actual form and as a pattern to model it by, but the associated thing would be read into the form which was then usually named. Thirdly, the connection might be remote. The form might be named with the feeling that there was but little justification for the name. The name was then usually

the most prominent thing in the association. Fourthly, an emotional reaction giving meaning and familiarity to the form was sometimes present when the subject denied the existence of an association of any sort. While the association proper, visual image or verbal, had always the effect of adding this emotional complex, the latter might exist alone. It was quite common, too, for that feeling to precede any trace of a visual image of the form. In such cases the subject would describe his experience as that of feeling that he knew the form, of feeling sure that he would recall it in a moment, while yet he failed to do so. There was a different atmosphere surrounding the different forms that gave each more or less an individuality of its own, which caused the subject to approach the recall of the forms with different attitudes. While this was not marked enough in many, perhaps in most of the cases to receive special mention by the subject it seems very feasible that this emotional complex played a large rôle in the actual recall of the forms. But its analysis or even the determination of what part it played in recall was beyond the methods of the present study, and no special efforts were made in that direction. Whatever the form in which associated processes appeared, their general use as means to recall was to serve as cues to the recall of the visual image of the form as a whole, and in this respect, whether in terms of visual or verbal imagery, differed from verbal descriptions as a class. Considering only those cases in which they were thus means to recall, the associations aided in bringing up a general, often indefinite visual image of the form as a whole, or of the parts to which they were attached. As the subject often stated, they prevented the form from being forgotten altogether. They did little further towards filling in the details. These had to be recalled for the most part by other methods. The degree in which this was the case depended, of course, on how closely the actual form resembled the thing associated with or read into it.

(d) *The Characteristics of Verbal Descriptions.* — The part played by verbal descriptions in the recall of the forms can be inferred largely from what was noted above as to how they were used in learning the material. They were used for the forms

and parts which the subject found difficult to learn by merely looking at them. In a very rough way they entered the later recalls in the ways they had entered in learning the forms in the first place. The difficult parts were as a rule not recalled directly in terms of the visual, but the visual was built up through a recall of the verbal descriptions. Unlike the associations, however, they were rarely used for the recall of the visual of the form as a whole. They applied to the details after a general visual outline or pattern was already present; an outline that the subject at once regarded as only an outline in need of corrections and completion. They played their part further in getting the visual corrections for the associations made, so far as the latter varied from the actual form. And again with the forms that were more or less difficult throughout so that hardly any visual image of its general outline preceded, the recall of verbal description might come in almost at every point in the form. Special mention should be made here again of the very incipient character of the verbal descriptions in which they so often appeared. Apparently there was a very strong tendency for all but one of the subjects to describe incipiently the characteristics of a form in a visual image as he noted them. To attend to such characteristics meant largely to thus describe them.

(c) *Motor Impulses.*—It was observed that the development of the visual image might be gradual and continuous from the beginning to the end of a form. This carried with it a strong tendency to a corresponding eye-movement. As the image developed the eyes incipiently followed its progress. In some rarer instances this tendency to eye-movement assumed a greater independence of the visual image. In these the subject described himself as 'feeling' that the form extended in a certain direction, or that the eyes moved back and forth several times from one point to another with the expectation that the visual image would appear accordingly without it doing so at once. About the same is to be said of tendencies to hand movements, the movements of writing or of drawing. These were less frequent but with one subject seemed to be more prominent than the eye-movements when they were present at all. About

the part these motor impulses played in the recall of the visual very little can be said. There were not very many instances in which the subject stated that they preceded the visual. Their simultaneous appearance with the visual was the rule. The inference might be, therefore, that they were, so far, not aids to recall. However, the observation was made a few times that they not only preceded the visual but were the means of its recall.

(*f*) *Relation of Factors when Recall is Uncertain.*—There remains to be considered some of the ways in which these different factors in recall are related when the recall is uncertain. Recall might be uncertain because of a rivalry, when some sort of memory sanction went with each of two or more factors that conflicted. Or, it might be uncertain in the absence of such rivalry, from other causes. To the latter naturally belong by far the larger number of cases of uncertain recall. There are, of course, many instances in which the subject has tried on all the methods of recall, has brought in all the aids without complete success. The last resort in these instances is generally visual recognition. The form is actually drawn from a tentative image to see how it looks, and then re-drawn a number of times to make it look more satisfactory. The final outcome of such a procedure was often the statement of the subject that the drawing looked wrong but that he did not know where or how to change it so as to improve it. A special instance of this kind that was quite common were cases in which a description on account of its ambiguity was itself inadequate for the recall, and recognition remained indifferent to the several different visual images that might be constructed. A real conflict or rivalry between the different factors or between different imagery of the same class occurred in several different ways. In these a distinct memory sanction went with more than one construction of the form and resulted in uncertainty as to which was correct. This might occur between two visual images. A form or part might look right when taken by itself, but when considered in relation to some other form or part it might appear wrong as imaged or drawn, and seem right some other way. More frequent were the conflicts between the visual image of a

thing associated with a form and that of the actual form. Here of course, no separate and definite visual image of the actual form would be present, but rather the subject would feel, recognize, that the form as he imaged and drew it was too much like the associated thing, while yet there was something about the former that tended to make him accept it as correct. Still clearer cases of real conflict were those in which a visual image would come up and by itself be regarded as quite correct, while at the same time certain verbal descriptions recalled would contradict the visual image. Quite a number of these cases occurred and in many of them the subject in the end gave up the recall with the statement that he did not know whether visual image or verbal description was correct.

3. *Dependency upon the Nature of the Form.*—We may turn now to a special consideration of the factors already named that influenced the nature of the imagery. The forms as given could be roughly classed into three groups. (a) The familiar form with some alteration attached. (b) The continuous irregular curve. (c) The several-part form of simple straight and curved lines.

(a) *The Altered Familiar Form.*—The familiarity of a form depends of course on the degree of the subject's success in reading meaning into it. First in this class were the altered geometrical forms and I shall limit the description to them. The subjects, without exception, regarded these as easy forms. In learning the group they were at once recognized and picked out as such, and but little time was spent on them. The exact nature of the basis for this faith that they could be easily remembered seemed peculiarly hard to determine. It was not the presence of the association, the name of the form, nor a general visual image of an associated thing. These were in by far the majority of cases quite in the background or entirely absent, and did not affect for this reason the feeling of the subject towards these forms. It was rather a distinct characteristic emotional attitude together perhaps with certain characteristics of the visual imagery itself. No further analysis was made of this. In the recall of the form this attitude was a part of the recall. The subject approached it with ease, and certainty that there would

be no difficulty. With the general clue to recall given, described before as some sort of visual representation of its position on the page, the subject would at once know its general character and that the form could be recalled at will. The visual image would be described as easy and very spontaneous. It would come up in a flash and stand out as a whole in clearness, in a definite, unambiguous, unwavering character. Or, it would come up part by part or develop continuously as it was needed while drawing the form. In the latter the subject was so certain of its recall that he seemed to deem it not worth while to go to the trouble of first getting a complete visual image of it before beginning to draw it. Cases of this sort were very frequent with this class of forms. Whatever the character of the direct visual image, the nature of the recognitive sanction was the same. It was immediate and decisive. There was no need of resorting to the recognitive method, drawing the form and then re-drawing until it looked right. All these characteristics, however, hold true only of the main parts of the form, of it so far as it corresponded to the familiar geometrical form that was read into it. The recall of the alterations was quite different. These constituted the details, and in learning and in recalling them verbal descriptions entered in the same ways as they did for any other kind of form.

(b) *The Continuous Irregular Curve.*—In most of its essential characteristics the imagery and process of recall for the form that consisted of a continuous irregular curve was strikingly different from that just described. These forms came nearest to remaining entirely meaningless. They were at once recognized/as hard to learn, and received special attention. With the general impression of meaninglessness went a special effort to read meaning into them, which was found difficult. When an association with the form as a whole was made it usually needed so much revision as to be of little service in recalling anything but the roughest outline of the actual form, and for this it was hardly ever needed after the extra time spent in trying to fix it visually. Characteristic in learning them was the abundant use of verbal descriptions. The fixing of the visual had to be helped out at every point by description. In the

recall later the attitude present in learning reappeared. They were approached with the feeling that there would be difficulty in recalling them accurately. The next thing then in the recall was visual imagery, direct, perhaps quite as often as some association or general description. The visual might be an indefinite, wavering image of the form as a whole. Or, it might start at a certain point in the form and then slowly develop through for the rest, with many hitches, ambiguous, and uncertain places. When it came up as a whole certain loops or large turns in the curve would stand out roughly more prominently than the rest, with only a vague consciousness of connections or other parts, and of their general position in the form relative to the parts that stood out more clearly. This much might come up quite readily. The form as a whole might be fairly easy to recall. The difficulties came in attempting to fill out the rest. The general character of the procedure in the other form of development of the visual image, when it developed slowly from one end to the other, was not so much different in its essential nature. In this case, too, the image would be made up of prominent, more or less clear, and indefinite, unstable parts. In both instances the recall of verbal descriptions came in at the points where there was hesitancy and difficulty in the visual imagery. It did not, however, enter so abundantly as might have been expected from its extensive use in learning the forms, although it was still much more frequent than in the recall of the other forms. Strikingly characteristic was the recognitive method of recall, one that in general was applied when all other aids failed.

(c) *The Several-part Form of Simple Straight or Curved Lines.* — In its more important aspects the recall of these is of an intermediate nature to that of the two classes of forms just described. It is a form made up of familiar, known parts, and to that extent it is easy. But the parts are put together in an unusual way, and in this respect the form is hard. The first thing characteristic about their recall was the frequent use of associations for the form as a whole. In the first class of forms, the familiar geometrical, the visual alone was so self-sufficient in the recall that the associations were rarely made use of. In

the second class the form was so irregular and unusual as to make it very difficult to read any meaning into it. In this third class the association with the form as a whole was both possible and necessary. With these they came in more than with any other as real means to the recall of the form as a whole. In accordance also with what we might now expect, the recall of the parts was easy. They needed no descriptive or other aids to decide their exact nature. The aids to recall were used in getting the relations between these parts, the ways in which they were put together. Thus the subject would seldom fail in recalling all the parts with certainty, but would often be very uncertain about their relations. Here the verbal descriptions, the special associations and the purely recognitive method were all employed because they were found necessary. There was more occasion for the description to be ambiguous. The subject would often recall in descriptive terms that a form was made up of certain angles, curves, straight lines without any further recall of their relations. The visual imagery in the recall had only one point that was characteristic of this class. It was more distinctly broken up into parts than was true of the other forms, as a rule.

4. *Dependency upon Repetition of Recall and the Lapse of Time.*—The time intervals between successive recalls of a group were short for the first few, and very much longer for last recalls. The differences that were found to go with these conditions were great enough to be distinguishable at least into three grades or classes, and I shall attempt to describe them in this way. The second stage will show the influence of repetition of recall after short time intervals. The third will show the influence of long time elapsed during which the forms were not thought of at all. It is not to be understood, of course, that a certain kind of recall always went with a certain time interval, nor even that the memory for each form passed definitely through the three stages to be described. All that the results show is a constant tendency in the same direction. Whenever changes occurred, and there did in most cases, they were of the same nature. But in the individual cases the recall of some forms could never be classed under the first, while that of others never reached the third stage.

(a) *First Stage.* — The cases that fall under this class are limited almost entirely to the first recall of a group. Its main characteristic is the rapid dropping out of the verbal descriptions used to fix the details that had been specially noted. During the ten minutes allowed for learning the group many such descriptions would be made to fix the visual. Half an hour or so later in the first recall it was a very common observation on the part of the subject to note that he had used many descriptions in the learning which now were not made use of in the recall. He recalled the forms directly in the visual, with the recall of the descriptions following, or with merely the recall that some descriptions had been used but were already forgotten. This was much less true of the associations that were made with the forms as a whole. Such an association was but very rarely forgotten during the first sitting. It was also more apt to be really used as a means to recall at this time than it ever was later. The visual imagery was of an average spontaneity. Much of it came up only through the recall of associations and verbal descriptions. With this recall went only about an average degree of certainty on the part of the subject, perhaps even less.

(b) *Second Stage.* — The main characteristic of the second stage is an increased spontaneity of the visual imagery and the relative absence of associations and descriptions as aids to recall. The forms are recalled for the most part directly in terms of visual images, and the corrections and revisions to be made in the first image take place without descriptive or other aids. Further characteristics of greater spontaneity of the visual image are its more ready appearance, with less pauses, and less hesitations as to correctness. There is an immediate and greater certainty and satisfaction. The associations and descriptions that do come in are more apt to follow than to precede the visual, and the greatest use that they can have is to strengthen the recognitive sanction that goes with the visual image. This they may do, but the cases in which they are regarded by the subject as entirely useless in the recall are most frequent in this stage.

(c) *Third Stage.* — The last recalls show the marks of a

partial loss of memory of the forms. The first of these is a general inefficiency of the visual imagery, and a lack of spontaneity. The recall is more likely than before to be preceded by an interval in which neither a visual image or any aid is recalled. When a part of the visual arises it proceeds more slowly in its development, is more apt to be broken up into parts with time intervals between the recall of the different parts, and with decidedly more wavering and hesitation as to the correctness of what comes up. Several slightly different images are apt to arise, having attached to them hardly any recognitive sanction. The recognitive method is more frequently resorted to. The subject's attitude towards the form as he finally draws it is also characteristic. It is likely to be either that of indifference, or of uncertainty. In the first stage he may be uncertain, but rarely indifferent. In the second he is generally certain. This indifference means that a visual image of a form comes up perhaps with relative ease and absence of rivals without any definite or strong memory sanction going with it. There is nothing to suggest that it is wrong, and in connection with the other characteristics its correctness is taken as a sort of matter of course. It is of the nature of the cognitive instead of the recognitive state. With the difficulty to recall the form at once in purely visual terms goes the attempt to find aids to the recall. The associations for the form as a whole are likely to come in again as a real aid. Aids are found more necessary for the recall of the details, but here the subject finds that he has forgotten much of the verbal descriptions once used. He may remember at what points they were used before but have forgotten what they were. This is quite common. The recall of false descriptions is also characteristic of this stage. Often the subject stated that he recalled a certain description when that description did not fit the original form as presented to him at all. These are probably mostly instances in which he had on previous occasions descriptively noted certain characteristics of his visual images, cases in which these images were wrong. In some instances they are descriptions of previous drawings that are wrong. Finally, these last recalls are characterized by a greater frequency of rivalry between the different

factors in recall; rivalry between the different visual images, and between a visual image and a verbal description.

5. *The Errors Made.* (a) *Their Relation to the Subject's Attitude.*—The errors made by the subjects in the drawings of the forms should be considered in close relation to the foregoing description. That will make many of them already intelligible, and a further consideration of their causes will throw additional light on the nature and analysis of the memory consciousness. It would be natural to suppose that the errors would be most frequent at the points where the subject found the most and greatest difficulties in learning the forms, and again in the recall where he was not certain of the correctness of his results. But, as a matter of fact, there are so many important exceptions to this that neither of these generalizations would be valid. It is true that errors occurred most for the minor details, and these were the things for which the visual imagery alone was found most inadequate, for which various descriptive aids had to be brought in. But this was not true of all details. And again, it was often in the forms that the subject called easy that he made the most and greatest errors. The frequency of the errors made, therefore, has no regular relation to the subjects' feelings of the ease or difficulty in learning the form. At certain points the subject was especially aware that he was probably making errors, and in a few instances he even noted a possible cause of error. Of the details of the form made up mostly of one continuous irregular curve the subject was as a rule more or less uncertain. In this his memory judgment was usually correct. Errors were frequent here. But errors were perhaps quite as frequent in some other kinds of forms in the recall of which the subject was entirely unaware that any could possibly have occurred. There was, therefore, no regular relation, either, between the frequency of errors and the subjects' degree of certainty and the correctness of his recall.

(b) *Their Permanency.*—A cursory examination of the results suggests a two-fold classification of the errors. First, on the basis of the permanency of the error after it once appeared, and of how it changed when it did not remain constant in the successive drawings. Second, on the basis of the causal

factors that are evidently at work in producing them. Briefly followed out, this scheme will make their description complete. Something may also be suggested at the same time towards accounting for their permanency or variability. By far the majority of the errors that occurred were present in the first drawings, and remained more or less constant throughout the successive recalls. This was unquestionably a consequence of the conditions of the experiment. The subject had only ten minutes to look at the original forms. During the first sitting and again in each following one he had occasion to look at and consider his own drawing of it for about an hour. Thus the later recalls were perhaps recalls of the previous drawings as much as of the originals. All the errors, therefore, that appeared in the first drawings would be permanently fixed and regarded as part of the original ever after. A much smaller number did not remain permanent. In some of these the changes took place in a constant direction. The error would remain the same in character, but increase in degree in the successive recalls. In others the error changed in character, or at least did not simply increase in the same direction. In cases of the latter class the explanation of their behavior is by no means entirely clear. It can for the most part not be safely inferred either from the drawings or from the introspective notes. The notes are not always complete enough to include full reasons why a particular part in question was drawn just that way. When the changes in the errors were all in the same direction the causes were in nearly every case quite readily determined. These need not be taken up separately at this point. In the following classification and description of the errors according to their causes, the latter are taken up in the order of frequency with which they produce errors.

(c) *The Errors According to Their Causes.* — It might be supposed that an inference as to the cause of any memory error would necessarily be very unsafe. Our memory consciousness is so very complex and the number of different possible causes in any given instance so very great that we should hesitate to say anything about what the real cause was in any given case. On merely *a priori* grounds this attitude would

be quite the correct one. But the nature of the results in this case is such as to dispel this difficulty. At least those causes that will be enumerated are perfectly clear.

(1') *Ambiguous Verbal Description*: A small number of errors resulted from ambiguous description. The subject might, for instance, note that a form was made up of certain familiar parts, curves, straight lines, angles, etc. This in itself would make the form seem easy. But when he came to the recall of such a form later he would often find that the relation of the parts had not been sufficiently observed. He would recall the names of the parts and their exact visual imagery quite readily. But he could not put these parts together so as to be recognized as correct either from the visual imagery of the separate parts or from the descriptive names. Again, a form might be described as large or small in relation to some other, or a position might be described ambiguously in relation to some standard, as out of the vertical, or horizontal, or not quite parallel or perpendicular, as far or near; or the nature of a part be described as curved or angular. These descriptions were indeed aids to recall, but since the recall through them could never be more accurate than the descriptions they sometimes left room for a wide range of error.

(2') *The Influence of Associations*: The influence of an association as a cause of error has already been suggested. This was quite common in the cases of an association with the form as a whole, in fact, it was the rule when a definite use was made of the association in recall. That influence consisted simply in changing the form as recalled so as to resemble the associated thing more than the original form as presented did. The change tended to take place gradually. Apparently the subject forgot gradually more and more the points of difference between the associated thing and the real form, so that when in the later recalls the association was still made use of the visual image of the associated thing took the place of that of the real form without any suggestion of error to the subject. Out of quite a list of illustrations of this influence there were very few clear instances in which the subject was suspicious of it. In these that suspicion consisted merely of a vague feeling that

surely the real form was not so much like the associated thing as drawn, while at the same time when the drawing was considered by itself with no special attention to its great similarity to the associated thing it seemed quite correct.

(3') *The Influence of Certain Standards in Forms, Positions and Relations:* A third source of error is quite similar to the influence of associations, but appeared in a variety of ways, or consisted perhaps of slightly different factors. These may be enumerated separately without a special consideration taken of the characteristics they have in common, for these will be evident enough. First among them to be mentioned are the standard, simple geometrical forms. In the cases where the form or a part as presented very much resembled one of these the small differences tended to drop out in the later recalls. A special instance of this that was very frequent was the part of a form that consisted of a slightly irregular curve. The irregularities dropped out making the part a smooth even curve. This might be the effect of an association were there not so many cases of this sort in which the subject denied that the idea of the geometrical form had at all occurred to him, and were there not so many quite similar cases in which no such association was possible. These similar cases are instances, first, in which errors in position of a form or part occurred. A line that was not quite vertical or not quite horizontal in the original form tended to be recalled as just vertical or just horizontal. Secondly, the parts of a form tended strongly to take on certain standard relations to each other. Parts that were not quite parallel or perpendicular to each other tended to be drawn just parallel or just perpendicular. Thirdly, parts that were not quite equal in length tended to be drawn equal. Fourthly, parts tended to be arranged symmetrically where no exact symmetry existed in the original, in some instances changing the nature of the parts considerably at the same time. Crossing points were placed at the middle when in the originals they were a little away from the middle, or were placed at the ends when in the original they were not quite at the ends.

C. DISCUSSION.¹

This study was made in the spirit of Titchener's recent reassertion that the best way to make a mental analysis is to appeal to consciousness directly, rather than to use the psychophysical methods in which the analysis is an inference from objective data instead of the introspective.²

Memory studies in which the former methods have been used are numerous. These have clearly established a number of things, first among them in importance for our present consideration being the fact that very much less can be remembered of a material that is very simple in its nature than of a material that is more complex. The inference also from this that the amount remembered depends in the first place on the number and closeness of associative connections with the material and between the different elements of it is undoubtedly largely correct. But it is wrong in so far as it overlooks the extent of the influence of the other factor which introspective observation brings out. The few results of the present study show clearly enough that associative connections are a great aid to recall, if any further proof of this were needed, but they also show that the matter of inherent spontaneity of the imagery directly concerned in the given material is an aspect of recall equal if not of greater importance than are associations, and that spontaneity is not necessarily dependent upon associative connections if introspective observation is to be at all relied upon. The familiar geometrical forms were the easiest to recall, but also those for which the subject was most apt to deny the use or presence of any associations whatsoever. Again, the spontaneity of the imagery in the three stages described varied independently of the frequency of the use of associations. The second stage, *e. g.*, showed the greatest spontaneity of the visual imagery, but the least use of associations. To what extent spontaneity is to be attributed to what psychologists have usually called the influence of repetition needs no discussion

¹ For a summary of results see pp. 343 f., if this is desired, before considering their discussion.

² Titchener: 'The Problems of Experimental Psychology,' *Am. Journ. of Psych.*, 1905.

here. The interest in this kind of fact lies not in its cause, but in what evidence it gives in favor of one of the two opposing theories of recall, the theories, viz., that all recall is mediated through some associative connection, and second, that recall is sometimes of a spontaneous origin, thus breaking the associative continuity of mental processes. In this connection it is to be borne in mind that the associations made use of in the recall of the forms in this experiment were not associative links between the different forms of the group. They were associations with one or the other particular form and were entirely foreign to the rest of the group. The only reason why they could come in at all was because they could be more easily recalled directly than the forms themselves with which they were associated. In other words, the imagery of the associations possessed a greater spontaneity than did that of the form itself. In all these cases we have instances in which the mind makes use of the fact of greater spontaneity of certain imagery to insure recall of the thing with which it is associated rather than depend on the law of contiguity for the recall of the other forms of the group. In the present study indeed the latter was found again and again entirely inadequate for the purpose of recall. Nearly all the characteristics of the recall were not such as pointed to associative connections mediating the results, but the ways in which the imagery came up indicated rather that it depended much more upon its own inherent nature and organization. To say, then, that a complex material is better remembered than a simple because of more associative connections becomes in the light of this consideration not more than a half truth. The complex material is at the same time the material that has been most frequently an object of consciousness. The fact that small differences in sense qualities, *e. g.*, can be remembered but for so short a time may be due more to less spontaneity than to less associative links on account of the simplicity of the material. The objective results of psychophysical methods have carried the analysis further by showing that more is remembered of a given material if the subject is allowed while learning it to (a) articulate the associated names, or is allowed (b) certain motor processes of hand movements at the same time while he is look-

ing at the material, or if (c) the material is presented jointly to more than one sense than when it is presented to one sense alone. This involves more than merely the increase of associative connections. The results of the present study are in harmony with all and they verify the first two. We have seen what part verbal description and associated names play in the recall of the material used, and also, to some extent, how motor processes come in. The objective methods of Stern and others have also already taught us much on the degree of normal memory illusion, and have indicated some of the external conditions on which that degree depends. My results do not give much on the *degree* of memory illusion. But they give at least equally important data; they show something of their nature, and very distinctly some of the causes that produce them, and, in my opinion, establish the validity and greater usefulness of the method for working out their whole psychology.

These are all the general points of any significance that the results of this study have in common with others in which introspective observation was not made use of. Let me turn now very briefly to their further interpretation. Limited as the results are to the mental imagery and memory of meaningless visual forms, they cannot go very far towards an analysis of the memory consciousness in general. Their significance should be judged only in the light of the much larger program for this general method of approach. If we had much more extensive results not only for visual material of different kinds, but the same also for all the other sense departments, we have reason to suppose that they would give us a far better understanding of this whole question than the results of objective methods ever could give. At the same time a few points of general significance that even this study has brought out may be considered here. The analysis has not merely shown the existence of certain associated processes in the recall of a material that is presented to one sense alone, but it has gone a considerable ways towards determining at just what points, in what ways these processes enter, and what their exact function in the memory consciousness is. In the present experiment the tendency is for the material to be recalled directly in terms of

imagery that belongs to the sense to which the material was presented. This is the simplest expression of mental economy. It indicates that, so far, nothing enters consciousness that does not serve directly the end desired. But the visual imagery was found so inadequate for its purpose that at many points associative aids had to be resorted to in order to reestablish the visual in its full integrity. With the frequent repetition of the recall the visual attains a greater degree of spontaneity. This, taken in a large way, is a gradual process, during which the associative and other aids recede step by step. They first come in as aids to the recall, then only to reinforce the memory sanction that goes with the visual image that is already present, then cease to do even this while yet they enter, and finally drop out altogether. This gradual elimination of the aids to the recall is another expression of mental economy, which culminates at the point where the subject not even goes to the trouble of first getting a complete visual image of the form, but begins to draw at once from the first suggestion, letting the visual image develop as needed while drawing; or, if the few observations on this point are to be taken as indicative of the direction in which the truth lies, it culminates where the subject draws from a motor memory, where he denies the presence of anything that can be called a visual image.

This strong tendency for the mind to follow 'the line of least resistance' is reflected again in the character of most of the errors that are made. These can almost all be described by the one general characterization that an easier visual image that is more or less incorrect is substituted for the correct image of the actual form which would be more difficult. At least this description applies to all those errors that are not due to errors in the aids to recall, but are connected directly with the visual image. The visual image constantly tends to take the form of one that possesses the greater spontaneity. It tends to the visual image of the association that is made, an association whose only reason for existence in the first place, as was just noted, is the fact that it possesses a greater inherent spontaneity than does the exact visual image of the real form. It tends to certain standard positions and relations, such as the exact vertical, the horizon-

tal, the symmetrical position, in each case undoubtedly because these relations are more easily held in mind and recalled than the exact amount of variation from such a relation would be.¹

This brings us to a second matter of general significance which the results clearly indicate — the degree of resemblance between the inner organization of the memory imagery and the process of recall on the one hand and that of the perceptive experience on the other. There is still a tendency in psychology to accept the naive conception of memory consciousness as weakened copy of original perception with a recognitive factor added. Perhaps there is no great need any more of combatting this conception. But it may be well to let such results as those of the present experiment remind us of the degree and ways in which such a view is a misconception. Compare on this point again the kind of consciousness, its content and organization, involved in learning the material with the kind of consciousness involved later in the act of recalling that material. Certainly the process of recall is not a weakened repetition of the process of learning. The total process of recall in the later instances was a quite different thing from the first recall immediately after the presentation of the material, and between these, for the different time intervals, were found many variations in that total process. Further, these variations had a wide range, not only for the different time intervals and the frequency of the recall, but were influenced also by the nature of the form. Nor can it be said with much more validity that the final result of the recall, the completed imagery that is used in drawing the form again from memory, is a weakened copy of original perception. In striking contradiction to this view is first the fact that in many instances no such completed image came in at all in drawing the form. Consider in this connection the differences in the nature of the visual image accordingly as the form was a very easy and familiar one, or, on the other extreme, was the very meaningless continuous irregular curve. Yet, on the side of

¹ This is in close harmony with Leuba's hypothesis, which Stratton also accepts and elaborates, that our memory tends to the more usual and common in our experience. Leuba, 'A New Instrument for Weber's Law, with Indications of a Law of Sense Memory,' *Am. Jour. of Psych.*, Vol. V., p. 370. Stratton, *Experimental Psychology and Culture*, New York, 1903. Ch. IX.-X.

mere perceptive experience there could be no great difference between the form that was easy and the form that was hard to learn and to remember. The characteristics of the continuous irregular curve were as easy to perceive as were those of the simple square or circle. With the same visual perceptive experience we find the visual memory image at times more or less adequate for the purpose of drawing the form again correctly, at other times we find it hopelessly inadequate. And again, the visual image might be regarded by the subject as 'good' while his drawing is quite inaccurate, and *vice versa*. Less intensity and vividness is among the least of the characteristics in which the memory imagery differed from its perceptive experience. Lastly, the function and importance of what is usually termed the 'recognitive factor' is not adequately described by calling it merely an added factor in the sense usually meant. It enters into the inner organization of the memory consciousness at every point in the recall, rejecting here and accepting there, thus determining the whole course of recall and the final product together, as well as being a mere reaction to that product when already present. Whatever the elements are in this emotional reaction, it is a reaction that enters before as well as after the image is completed. In addition to this there is another 'added factor' that is perhaps closely akin to the recognitive. This is what has been described as the characteristic attitude with which the subject approaches the recall of the difficult and the easy form. The emotional reaction that is characteristic of expected ease or difficulty of recall is often a very prominent factor after the first clue, such as the indefinite visual representative of its position, is given. Nor is the subject indifferent in this respect at any point in the recall. Every step is wrought with tinges of emotional reactions to what else is going on in consciousness, although this may often escape the subject's notice because of its nature it is difficult to analyze out and describe. The original perception of a form may be a very 'cold-blooded' affair while its recall from beginning to end is alive with a content that did not enter into the original perceptive experience. In a word, taking all these several matters into consideration, it must be observed that what we have called the total process of

recall is very largely not recall at all, and can never be described even half correctly by calling it reproduction. It is rather a construction, not a reconstruction, a construction of a certain result that is accepted in place of the original, and far from a reconstruction of a past perception.

D. SUMMARY.

In learning the forms the subject alternately noted their characteristics and then tried to recall them. This was a method of determining difficult points and to these special attention was then given. They consciously sought for associations for a form as a whole, and, less frequently, for certain distinct parts of a form. These associations served as aids to the recall of the form as a whole or of the parts in question. A second general aid for fixing, and for recalling the visual image of a form was verbal description. This was used for the most part at the points where special difficulties were found, for the minor details, and for necessary corrections in associations that were used.

In the recalls the direct visual imagery showed distinct grades of spontaneity, and differences in the order of its development. With the somewhat indefinite visual representation of a form's position given, its visual image might flash up at once as a whole, clear and distinct and without any alterations taking place. With these acceptance as to correctness was mostly immediate and complete. In other cases a certain interval, variously filled, might follow the first recall of its position before anything about the form would come up. The visual image of the form itself might develop slowly, in a fixed order from beginning to end, instead of all parts simultaneously. In this gradual development several similar images might come up one of which is finally kept as correct or nearest correct. With those not kept usually went a slight memory sanction, a recognition that the real form was something like this. Sometimes the subject guided his imagery purposely in this way as a means of accurate recall when there was some difficulty. Or, instead of this sort of gradual development, the image might simply stop at certain points, and after some hesitation proceed again

in a direction that was accepted as correct. For particularly easy forms the subject would be apt not to go to the trouble of first visualizing the form in all its details before drawing. The visual image would come up part by part, or in other ways as needed while drawing. For particularly difficult forms or parts the subject resorted to the recognition method. He would do the best that he could with his visual imagery, draw the form accordingly, and then decide from the looks of his drawing at what points it was wrong, and re-draw it until it looked as satisfactory as he could make it.

The uses made of associations and verbal descriptions have certain things in common. Either might be used as real aids to recall the visual; it would be recalled first, as a means of suggesting the visual. Or, either might be recalled after the visual image had already appeared. In this case it might strengthen the memory sanction as to the correctness of the visual, giving added assurance, or it might leave the recognitive state entirely unaffected, coming in as an entirely useless factor in the process of recall.

The association, as a rule, was connected with the form as a whole, and was a means of preventing it from being forgotten altogether. It might be in the form of a visual image of the associated thing, or consist merely of the name of the thing. Various degrees of closeness of connection existed.

Verbal descriptions were used for the most part for minor details, for the relations of parts, for the positions of crossing points and endings of lines, for corrections necessary in the associations made, etc., and sometimes for a general description of a form as a whole, approaching more in this case the nature of an association. They were quite apt to be of a very incipient character, so that the subject was not always certain whether they had come in at all, or what use had been made of them.

Certain motor impulses were sometimes described by the subject. These consisted of tendencies for the eyes or hand to move along the form as it appeared in the visual image, in the direction and order followed in the drawing. In a few instances these preceded the visual image and were regarded by the subject as real aids to recall.

Two large factors present influenced the character of the recall and the nature of the imagery. (1) The nature of the form. (2) The frequency of repetition of recall and the time elapsed. The recall of the altered familiar geometrical form the subject approached with a characteristic attitude, a feeling of ease and certainty that there would be no difficulty. The visual image came up readily, unwavering in character and was at once accepted as correct. Associations very rarely were needed as aids to recall, and as a rule remained much in the background of consciousness. Descriptive aids for the alterations in the actual form from the familiar geometrical were used here as in other forms to recall details. The forms consisting of a continuous irregular curve were the most difficult and their recall approached with an attitude the opposite in character to that in the preceding. Associations were specially sought for but difficult to find. Much verbal description was needed for the various details in the curve. In the recall a first very general and schematic visual image, which was at once regarded as such by the subject, might be quite easy and spontaneous. Special and great difficulties were then found in recalling the details, in which the recall of verbal description generally came in as an aid, and for which the resort to the recognitive method was frequent, with the final result often uncertain. Or, the visual for the form as a whole might develop in order from one end to the other, with the hesitancies, resorts to aids, and uncertainties entering at the difficult points of details. The recall and nature of the imagery for the several part forms of simple straight or curved lines was in a way intermediate in character between the other two. In these the parts were familiar and easy, but their relations unfamiliar and difficult. Associations were found necessary and also possible. Their use as real aids for the recall of the form as a whole was frequent. The recall of the parts by themselves was relatively easy, but their exact relations difficult and aids often resorted to.

The influence of repetition of recall and of the time elapsed was great enough to make distinguishable at least three stages. The first is characterized by a rapid dropping out of verbal descriptions as aids to recall which had been used in the learn-

ing, while yet they come in as real aids more abundantly than at any other time. The more frequent use of associations, an average spontaneity of the visual imagery and degree of certainty are also characteristic of this stage. In the second stage the visual imagery shows the greatest spontaneity. It comes up readily at once, without associative or descriptive aids. The first image is more apt to be correct, and if not, the corrections are made directly in the visual. Immediate and a strong degree of certainty goes with the visual imagery. Associations and verbal descriptions come in after the visual images and without affecting the recognitive state oftener than at any other time. Marks of a partial loss of memory characterize the third stage. There is a general inefficiency and lack of spontaneity of the visual imagery. It develops slowly, with many hesitations and intervals during which neither visual or other aids arise, and in wrong directions with only a slight degree of recognition of their inaccuracy. Previous associations are sought for and enter again as aids to the recall of the form as a whole. The subject tries to recall verbal descriptions for the details, but finds that he has largely forgotten what they were. False description, and rivalry between the different factors are frequent. Resort to the recognitive method, drawing the form and determining corrections from the drawing, is found more necessary than ever before, and the subject is more often uncertain or indifferent to the final result.

The errors made in the successive drawings of the forms had no regular relation to the subjects' judgment of ease or difficulty of the form while they were learning it, nor to his certainty or uncertainty as to the correctness of his drawing. With reference to the permanency or course of development they fall into three classes. (a) By far the majority of the errors appeared in the first drawing of a group and remained constant in the later drawings. A smaller number did not remain permanent. (b) Some of these remained the same in character but increased in degree in a constant direction, generally indicating a definite cause of error at work. (c) Others changed in character, or at least not simply in degree in the same direction. The causes of these were not often evident.

With reference to their causes, the errors fall into three classes, though in the last possibly several slightly different factors are included. The definite objective results together with the detailed introspective notes generally left no doubt as to the interpretation as to the cause of the error. (a) Ambiguous verbal description when the visual alone was inadequate to correct recall often results in error. (b) The influence of an association made with the form as a whole or definite part tended to make the drawing more like the associated thing than the real form. (c) (1') Certain parts of a form approaching in character that of parts of certain familiar geometrical forms tended to be drawn more like the latter than they were even where the subject denied all traces of any association with the part in question. (2') With reference to position on the page, lines that were not quite vertical or horizontal tended to be made just vertical or horizontal. (3') Parts of a form that were not quite perpendicular or parallel to each other tended to be made just perpendicular or parallel. (4') Parts that were not quite equal in length tended to be made equal. (5') There was a tendency to arrange parts symmetrically.

In this study I am indebted to Professor E. C. Sanford for suggesting the general problem and for encouragement to take it up, and to Mr. W. F. Book, Dr. E. Conradi, Mr. A. L. Gesell, and Dr. L. M. Terman, Fellows in Clark University, for much patient and expert work as subjects.¹

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DISCUSSION.

ORGANIZATION IN PSYCHOLOGY.

The demand for organization in psychology arises out of a dual interest. First, there is that of the teacher who desires to give a continuous account of his subject; second, that of the student, who would satisfy logical and æsthetical demands for unity.

One of the greatest difficulties that the teacher of psychology meets in the pursuit of his vocation is the almost total lack of plot in the average text-book. One could wish that the several chapters of the text, while serving to elaborate the general theme through the analysis of some particular character, might make the various characters so interact in the successive scenes as to stimulate interest in the development of the theme as a whole. Under such circumstances the psychologic story would move as it does not now. The sense of continuous movement, of interesting development of the theme, of a unified resultant conception in which the manifold analyses of the argument synthesize into an intelligible whole, is one difficult to bring to consciousness in the student. This difficulty, I believe, finds its main source not in the inaptitude of the student to the subject nor in the unpedagogical methods of the teacher, but in the text and in certain transitory conditions of the science itself. As I have indicated the text lacks plot and plot interest. Plot demands that the characters function one with another in a continuous movement. Each, while playing its own part, must be other, sufficiently, to suggest that there is an inclusive whole, an immanent unity. In such circumstances curiosity, that universal principle of interest, asserts itself instinctively. Suggestive parts and elusive whole reciprocally stimulate and support one another. The theme lives in an ever-increasing interest which is satisfied only when it is fulfilled in the denouement. Now can we assert, fairly, that text-books in psychology have, as a rule, met these demands and realized this interest? I think not. Few are the psychologies that arouse and maintain a powerful interest in the average student. However intensely they may excite his interest in detail they fail to carry him along with increasing momentum. His enthusiasm attaches to parts and not to the whole. Frequently it is difficult for him to realize that a whole is intended. The volume is a series of

chapters dealing with individual topics, conjoined but not organically united. As to plot — it is rare. Conjunction of parts is not plot; nor is every arrangement, even though it be according to a defined scheme. Plot demands a principle of movement which is immanent and dynamic in the parts, as well as parts each of which after its own kind and in its own degree consciously exhibits the movement of the principle. Now, how frequently do we find a single unifying principle consciously presented as a clue in the opening chapters of our psychologies and wrought thoroughly to the end? How often do the various chapters look beyond themselves revealing traces of antecedent conditions and opening up vistas of subsequent circumstances determined by their own movement? Can one hold as a truth concerning our text-books that, as in well-wrought pieces of literature, the chapters mutually assist one another and consciously advance the movement of a unifying theme? The majority of our psychologies are written from the standpoint of psychophysical parallelism considered as a working hypothesis. This, in itself, is fatal to all attempts at plot. Of every fact we have two descriptions and for every change we have two explanations. And this the student is quick to perceive. The separate stories cannot be woven into a single plot. Interest is divided and in division tends to lose itself. Were the study unified according to the tenets either of materialism or of spiritualism it could have a plot. In the former case the resultant conception would have tragic consequences for ethical presumptions; in the latter, the implication might appear to have a relation to the practical world similar to that now accorded to 'castles in Spain.' Nevertheless, there would be unity of organization and plot interest.

Furthermore, this desirable end would be attained also if the viewpoint of psychophysical parallelism were transcended and a working hypothesis substituted for it which would regard the distinction between physical and mental as functional and not as existential. Curiously enough, such unity of organization as exists in most psychologies falls mainly upon the physical side. We can unify nervous structure in terms of neurones and nervous function in terms of instincts and habit. We can trace their groupings and organizations to a very considerable extent. On the mental side a similar unity has been aimed at but has not yet been attained. It is common tradition that ever since faculty psychology received its coup de grâce at the hands of Herbart the science has moved forward steadily upon the assumption of there being unity in mental life. But it is one thing to be conscious of the actuality of such a unity and another to exhibit its imma-

nence through the organization of its parts. Doubtless it was natural that the developing science should center its interest in structure and in detail rather than in function and in the whole. Observations had to be made and observation means isolation and detail in work. Transitive activities had, in a sense, to be arrested, and such arrest resolves function into structure. Now, such piecemeal analysis, however necessary it may be, has the disadvantage that it does not conduce to exhibiting the vital interreaction of factors. On the contrary, it necessitates the substitution of a dissected body for the original organism. No matter how thorough the dissection and how clever the classification of the parts, they are none the less *dissecta membra* and must fail to exhibit the functioning of parts within a whole. This is the reason, I believe, why so many of our psychologies lack plot. Psychology has, in the main, been structural and not functional. Thorough studies and analyses of mental processes have been undertaken and carried through. The results have been registered and classified. But there has been an almost complete lack of such functional organizing of these results as would stimulate curiosity with reference to their interplay and would exhibit their interaction as well as the manner in which they are unified in their ground, the self. This isolation of parts, this lack of organization in the whole, forces itself upon the student and stands in the way, alike of his comprehension of the subject and of the development of an inclusive interest in it. He may be interested intensely in specific topics, but is keenly conscious of a marked hiatus in passing from one topic to another. This is true even of that God-send to teachers, James's psychology. The student's interest in it is of the episodic and not of the dramatic variety. He is charmed and enthusiasm is awakened in him in unique fashion by each of the successive chapters. But there is no denouement in the revelation of an organic whole. And what is true of James is true generally. The fatal hiatus existing between the contents of the successive chapters of structural psychology must exhibit the paradox of assuming an essential unity which its own method conceals. The truth of this contention is proven by the fact that symptoms of a definite change of view-point may be discerned in recent writings. This applies especially to the later writings of Baldwin, to certain portions of Miss Calkins's work, to the underlying method of the contributions of Dewey and Royce, to say nothing of others. But it has remained for Professor Angell to make the change consciously and to apply the new method with characteristic thoroughness and lucidity in a systematic work. His volume has a

marked plot interest and is functional to the core. Not only has he a single theme — that of the interaction of the psychophysical organism with its environment — but the successive chapters, while portraying their own distinctive characteristics, contribute each to the natural development of the theme and are constantly illuminated by the light cast upon each by every other. As a consequence the argument unfolds with constantly increasing interest and moves steadily to a unified conclusion. It is almost superfluous to recite that the volume appeals strongly to the student. Among my own pupils (the full Junior class of the college — 150 strong) it is held by all in equal favor with James and by many in greater favor. It is the only psychology that I have yet been able to place side by side with James without remarks disparaging to the newcomer being made.

As, for pedagogical purposes, there is a grave lack of plot in psychological treatises, so, also, for theoretical purposes, there is a similar lack of system. Ordinarily, no unifying conception is propounded at the beginning and its validity demonstrated through the progress of the investigation. There is no theory which defines psychic functions individually and also correlates them into a systematic whole. The nearest approach to this requirement has been made from the standpoint of physiological psychology. The hypothesis that every mental process has a physical basis or correlate has, without doubt, enabled the science to advance by leaps and bounds. But although we can, with moderate success, indicate the probable physical basis of the majority of psychic activities and can roughly schematize them, still two things much to be desired are lacking. First, the functional relationships of the varied physical bases have not yet been worked out; second, the knowledge of physical correlates in individual cases has not enabled the psychologist, in any marked degree, to bring mental functions under a single principle and to exhibit their organic unity. Moreover, even were these two requirements fulfilled the parallelistic hypothesis would still bar the way to unity as it has done in the past. So long as psychologists accept the psychophysical distinction as existential and not as methodological so long must they bid farewell to claims for systematic unity in their science. That psychologists, quite generally, accept parallelism as a working hypothesis will scarcely be doubted. It is an obvious inference that the science must exhibit a fundamental dualism.

Aside from this, psychology lacks organization in the arrangement of its subject matter. Suppose we take the well worn general divisions into intellect, feeling (affection) and will (conation). Is not this

a survival from a pre-scientific age in psychology? Is there any rational motive for treating intellectual functions first, affective second, and conative last of all? One might question whether placing the entire system of intellectual activities in the forefront of a psychological treatise is consistent either with the instrumental, pragmatic function ascribed to intellect as at least one of its critical phases or with a sort of spiral movement attributed to psychic functions in this development by the so-called circular reaction theory. Again, is not the position assigned to affection out of touch with the theory that emotion is the immediacy of our consciousness of the tension constituted by the clash of instinctive (and habitual) activities in misadjusted activity? This point is emphasized further by the theory that it is out of just such tensions in action that the mediating intellectual function arises and that it plays the rôle of opening up the way to a possible reunification of activity.

Again, we may ask, is the order of topics in psychological treatises indicative, as a general thing, of any ascertainable principle of organization? Has the semblance of order any more definite basis than that similar functions are usually classed together, that a certain endeavor has been made to place the complex after the simple and the reproductive after the original? At critical points the arrangement is anomalous, a fact sufficiently indicative of the absence of a thoroughly organized arrangement. For example, if instinct plays such a fundamental rôle, with reference to all conscious processes, as we are now coming to believe that it does, it is a curious arrangement that delays its appearance upon the scene of mental development until a very late hour. Habit, also, although it plays a part equally important with that of instinct, does not appear to have any well defined position of its own. Attention is gradually gravitating toward a position in harmony with its prominence as an intellectual function. The fate of interest and of belief, however, has been sad. Their lot — bandied about as they have been from point to point, when they have not been overlooked entirely — is worse almost than that of lost souls in Hades. Finally, the position assigned to the self in such a treatise as that of James, would seem to be conspicuously out of place. If the concrete self be the sole psychic reality one would expect that its consideration would furnish the grand conclusion in which the master-word would be spoken and all previous considerations unified in the presentation of the final all-embracing fact.

The lack of system is illustrated perhaps as fully by the omissions of individual psychologists as by any other circumstance. There

appears to be no common ground comprehensively covered. It will suffice, in proof of this, merely to call to mind the presence or absence in individual texts of such topics as interest, desire, belief, ideals, imagination (in distinction from the treatment of varieties of imagery).

If we view these facts together I believe that we shall be convinced that the time has come when structural psychology must pass definitely into functional psychology and when a unifying principle must be sought for the organization of mental activities. Furthermore, this principle must transcend the dualism of parallelism. For just so long as we work intelligently upon the basis of this method we must emphasize diversity and not unity. Yet every science must aim at the unification of its data. Either, then, we must admit that physical conditions are inessential to psychology or we must endeavor to transcend the dualism of psychophysical parallelism. Now I do not intend to enter upon a serious discussion of psychophysical parallelism at this juncture. Nevertheless, one may point out certain peculiarities of the hypothesis which may suggest the manner in which it is to be transcended. These peculiarities may be summarized as follows. The doctrine contradicts itself or, otherwise, the distinction and the parallelism asserted by it have merely methodological and functional values. If we regard the distinction of physical from mental as grounded in an existential separation of processes and then take parallelism seriously the theory lands us in absurdities. It presupposes what it must deny. We contrast the two processes and consequently must have knowledge of each. Yet, if there were an exclusive parallelism our psychoses should be totally and eternally unaware of, as well as uninfluenced by, their parallel neuroses. Our contrasting of the terms would indicate that they had a common basis; the parallelistic character attributed to them would suggest, further, the idea that a single process was under description, that a single fact was being read now in one set of terms, now in another—hence the marvel of the parallelism. Finally, their apparent duality for consciousness would indicate a polarity of function and not a dualism of process. Hence the real problem is to ascertain under what conditions and in what circumstances this polarity arises, its method of operation and its significance in the development of organic activity. To determine this and to utilize the insight as a clue to the organization of his science is the fundamental problem of the psychologist. The further question, as to how the quantitative values, to which the physical is most naturally reduced, are related to the qualitative of the psychical is one that falls within the primary problem in psychology as it does

within many others. No doubt it is of vast importance but after all it has no more special application to psychology than to physiology, biology and, chemistry. Indeed, it is essentially a question of pure methodology, viz., the part which mechanical and quantitative formulations play in the exact description, measurement and control of qualitative processes.

The unifying principle, therefore, that psychology demands is one which accounts for the polarity of the psychical and the physical functionally and which recognizes in them describable movements of a single organic process. It must enable the psychologist to use both methods of description in an entirely natural manner, to indicate how the single activity is modified now in terms of one phase of its movements and now of the other.

Now just as Professor Angell satisfied the demands of plot interest on the pedagogical side, so theoretically, he fulfills the primary demands of system. His psychology centers in a single unifying principle whose ramifications and bearings are exhibited at every turn of the argument. As a consequence the treatment is highly illuminating. The chapters do not follow the outworn arrangements of other days or by accident fall into a certain order. Each has a definite and noticeable position in the elaboration of the central theme and exposes in its own movement an individual characteristic of the unifying plot.

This principle is his conception of the psychophysical organism and the development of its conscious life through the solution of the practical problems set it by the necessity of constantly adjusting its activities in the presence of a changing environment. Although this biological standpoint¹ is not original with Professor Angell but is the expression of a dominant tendency in current psychology, nevertheless his thorough functional application of it is decidedly novel and original. His emphasis of the point of view and his consciousness of the necessity of system in psychology has opened up the way to an entire re-writing of the subject.

I shall next attempt to emphasize the necessity for organization by a brief outline of psychologic functions as this is determined by tracing out the clues furnished by the biological conception.

The biological conception, as I understand it, holds that the distinction of physical and psychical — of body from mind — is not one of which we are continually conscious. Under ordinary circumstances

¹ Especial recognition is due Professor J. M. Baldwin for his distinctive work in 'setting' the biological tendency as distinct from the physiological; see his *Mental Development* and *Development and Evolution*.

and in so far as our organic activities operate smoothly our experience is single. Individuality, qualitatively appreciated, is that of a continuous stream of activities unified as a single reality. When, however, this vital activity experiences inhibition within any phase of its movement tension arises and at once the distinction of physical from psychical emerges. In this tension of vital activities we locate the physical as that phase of the complex which serves as the dynamic base or support of the necessary adjustment. The psychical is the phase in which the adjustment is constituted. In so far as the adjustment is completed and perfected tension disappears and vital unity re-asserts itself. In further readjustments of activity the form of organization gained by previous adjustment appears as an integral part of the basis, *i. e.*, on the physical side. Now we apply the term instinct to native coördinations and habit to those which are acquired. Thus we may say that the distinction between physical and mental arises out of the reorganization of functional activities in which the tendencies toward the persistence of the native base are denominated instinctive; the tendencies toward reorganization — the psychical; the completed coördination, itself — serving as a basis for further adjustments — the habitual. Hence instinctive adjustments of function take on the form of the psychical and the complete organization of the psychical emerges as habit. Generalizing, therefore, we may say that the instinctive and habitual bases of organic development constitute what we designate bodily function; that the momentary reconstitutive adjustments comprise mental function: that the distinction is entirely functional and that the unitary living organism is the sole individual. It would appear necessary therefore that an exact treatment of the characteristics of instinct and habit and of their relation to psychic function should be given early in any general treatise upon psychology. Such a treatment would naturally lead in two directions. First, it would initiate such a general chapter upon the nervous system as is ordinarily given and which would serve as a basis for the special treatment of the physical functions which constitute the bases of mental activities in individual organic adjustments. Second, it would emerge in a chapter dealing with the general characteristics of psychic activities such as James treats under the title 'Stream of Consciousness.' This should emphasize the momentary and individual character of mental states, the unity of successive psychic streams, their discreteness, the organic and functional conditions alike of the discreteness and of the continuity which they exhibit, the focalizing power of the stream — with the conditions of its operation and direction, its discriminating and correlat-

ing moments with their organic motives. Moreover, such a chapter should also adjust the relations of the intellectual, feeling and conative phases of psychic activity in accordance with the clue furnished by the primary conception of the psychophysical relation.

According to my own notions this adjustment would take the following form. States of feeling should be taken first in order of treatment; intellectual states,—second; and conative,—third.¹ My reason for this arrangement is the following. In any adjustment involving tension the phase of psychic function directly evoked is that of feeling whether as sensibility, emotion or ideal. The organism, as it were, turns out as immediate appreciation its own inner value or *quale*. This view is supported in the extreme by the prevalence of intense sensibility in cases where nervous forces are strained to the limit and where the organism cannot, immediately, bring the irritating conditions under control; by the prevalence of emotionalism in the period of adolescence; by the emphasis upon feeling when old habits (*e. g.*, belief) have been broken up and when new methods of action have not yet been defined nor put into operation. Feeling, in short, is the phase of organic activity wherein an old coördination is undergoing strain or disintegration and where it has not yet got itself sufficiently in hand to define its own position or to control it. Conformable with this is the fact that in phases of activity where feeling predominates we look neither for defined views nor for effective action. They are states of confusion. The moment, however, the organism masses its activities positively and proceeds to the examination of its own condition for the purpose of overcoming the inhibition, feeling passes into intellect. Herein discrimination and correlation, leading to explicitness of definition, expose themselves. When definition has been completed, conation supervenes and the basis for a new phase of habit is established. Each phase of psychic activity may occupy a shorter or a longer period of time or its natural course of development may be aborted but wherever adjustment fully asserts itself feeling arises on the basis of instinct, defines itself as intellect, establishes itself as conation and emerges as habit. In further adjustments the gains made assert themselves as physical basis, *i. e.*, as habit-instinct, coördinations. As such they furnish material for richer appreciations as feeling, for fuller definitions as intellect and for greater effectiveness as

¹ However, as will be seen in what follows, this does not mean that feeling should be treated in its entirety before any investigation of intellectual and conative states is made. Only, *that on any given 'level'* it is more natural that feeling should precede intellect and conation.

conation. Consequently the chapter on the stream of consciousness should close with an elaboration of the circular reaction hypothesis of organic activity as a fundamental principle for the more complete understanding of the interrelation of the physical and the psychical and of the concrete development of our experiences in their totality.

Psychologists as a usual thing pass from such a general chapter as we have described (*i. e.*, if they insert it at all) to the detailed treatment in turn of the entire list of functions exhibited by each of the phases of psychic activity. For example, — attention, sensation, perception, memory, association, imagination, and reasoning are treated fully before any states of feeling are examined and these in turn before the conative field is explored. This procedure, it seems to me, is erroneous. It makes an organic treatment of psychology impossible, inasmuch as it takes each one of the phases of psychic activity out of its functional relationship to the other two and from within the organic movement of which it is a phase. If the intellectual function can be understood only in relation to feeling and to conation is it not essential that we should examine sensation and perception with reference to feeling on the one hand and to conation upon the other? In other words, is it not necessary to treat functions of the same level of simplicity or complexity in their natural order and relationships as phases of a single movement before passing from a lower level of complexity to a higher? Shall we not gain a better understanding of the individual states themselves and of the psychic activity of which they are phases if we examine sensibility, sensation and perception, impulse on one level; emotion, memory and association, character (so-called conscious habit — a misnomer) on another level; ideals, imagination and reasoning, volition on the third and highest level. The theory back of the classification is that the phenomena of any given level are really one fact considered in several phases. Organic adjustment, if taken in its most individual and most momentary function, constitutes itself as sensibility, or as sensation and perception, or as impulse according to the stage at which it is taken. A similar identity of function will be found to operate in the more complex groups of phenomena, the distinguishing differences within each being accounted for by the form of the total reaction constituting the several phases of the common movement. Having introduced simplicity into the treatment of phenomena upon the same level it remains to be noted in this connection that a like simplicity can be introduced into the treatment of the relations of the different levels one to another and to the total psychic movement. Here we avail ourselves of the light cast upon organic

development by the circular reaction theory. It was noted above that the psychic phase of organic activity tends, as the adjustment is more fully accomplished, to pass over into the physical phase of activity. From this, an occasion of further adjustments, it passes into richer, more defined and more effective forms of psychic activity. Thus every moment builds itself into the organism and exhibits traces of its effectiveness in the development alike of physical and psychical function. Accordingly, in emotion, in memory and association, in character we trace the continuity of organic life. In emotion, feeling no longer presents itself in the simplicity of sensibility, but modified by the articulation and enlargement of the total organic activity. The tension which in sensibility was confined to a relatively simpler complex of coördinations involves in emotion ever larger groups until, on occasion, the whole organism may be in reverberation. Thus momentary feeling becomes infused with the consolidated gains of the psychophysical organism, or at least such of them as its quality appropriately evokes, and as these are incorporated into it in the form of affection. Memory and association, as also character, exhibit the direction of similar organic mediation, the one in terms of the intellectual phase of psychical activity, the other in that of conation.

On the level where ideals, imagination and reason, volition play their parts in a self-conscious medium, mediation takes on the form of development in terms of ever more complete organization. The entire organism tends toward articulate and complete self-expression. This organic self-expression, developed through tension and appearing in the immediacy of feeling, constitutes the ideal within us. Defined as intellect it takes on the forms of our life of imagination and reason. Operative again as conation it is our voluntary behavior.

Certain peculiarities of this scheme of organization are to be noted. I believe that some attention to these will give added force to the general arrangement. First, it will be observed that psychic functions in their intellectual phase arrange themselves in pairs. That such an arrangement is natural is shown by the fact that it has been found impossible to give an account of one member of any of the three pairs without involving the other. Sensation cannot be treated without reference to perception or *vice versa*. And the same thing is true of memory and association, as also of imagination and reason. The situation simplifies itself when we observe that in these three pairs of terms we have the developmental history of a single pair on three levels. The single pair are the image and the idea. What is meant is that sensation,

memory and imagination are functions whose essential feature is the psychical image, whereas perception, association, reason have as their essential feature the idea. Now just as the members of the several pairs were indissolubly united so also are the image and the idea. They are distinguishable but not separable moments of the intellectual phase of organic adjustment. The image is ever the aspect of the adjustment in which the material of reorganization is defined: the idea that in which the material is correlated into a definite method of reconstruction. The one is analytic, the other synthetic. The life of feeling which provides the motive for intellect is single because undefined; the life of action — the terminus of the intellect — tends toward singleness because it has been defined; intellect is dual because in it the material and method of adjustment is being defined. Second, it will be noted that three important psychic phenomena are missing from the scheme. The three are interest, attention and desire. It takes no great insight to discern that these are functional centers to the three great phases of psychic activity. In other words, interest is feeling observed in its essential principle; attention is the intellect in principle; desire in itself is conation. Sensibility, emotion, ideals as forms of feeling are phases of interest. It is the unifying principle of which they are the concrete circumstantial manifestations. The same thing is true of intellectual states with reference to attention and of conative states with reference to desire. Once more we are brought back to the thought that feeling, intellect and conation are distinguishable only by their functions, for interest, attention and desire are the same active principle of adjustment taken now in its appreciative phase, now as definitive, and now again as executive. Moreover, this point is emphasized by the fact that even as psychic life is a unity, so its fundamental principles of psychic organization unify themselves in a single function — belief. In belief we find the fundamental principle of psychic organization. It is the common denominator and focal principle of interest, attention and desire. Operating as faith, it is the control center of feeling, *i. e.*, it is interest; as conviction, the control of intellect, it is attention; as practice, it is the essence of desire.

These considerations lead naturally to the final factors in psychic organization — the subject-object consciousness, time and space perception, and the self. When examining into the problems of psychophysical values we discovered a single fact — organic experience — which was thrown into contrast by the presence of inhibition and consequent tension. In taking into consideration the further fact of or-

ganic readjustment we were led to the identification of the physical with the forms of coördination (instinctive and habitual) which were sufficiently fixed to serve as bases in the reconstruction. The psychical was identified with the movement of adjustment itself. If now we take into account our fullest organization of the base of organic adjustment we describe the function as body, the immediately defined object in experience. If, on the other hand, attention be directed to our fullest organization of organic adjustment we describe the function as mind, the immediate subject in experience. The larger vista opened up by the interaction of the organism with the environment is the world of experience. It is not difficult, therefore, to see that the treatment of space-perception should give definite form to our view of the object both as body and as world, whereas the treatment of temporal perception should round out the subject of experience and should deepen our conceptions of the object. There remains the self. If we bear in mind that body and mind, object and subject, are but functional phases of organic activity, we are led to the conclusion that the unitary experience which is ourselves is to be identified with our total organic activity. Thus the self originates as organic activity, develops itself through tension and adjustment as body and as mind, and perfects itself in those forms of effective self-conscious activity in which the distinction of subject and object has been merged in the self-consciousness of free adequate function.

If this analysis be correct the problem of arrangement of topics in psychological treatises becomes relatively simple. It would seem natural that the general chapter upon the stream of consciousness should be followed by the treatment of the fundamental principles of organization in feeling, intellect and conation, *i. e.*, with interest, attention and desire in their general relations one to another, and to the development of psychic life. This would lead naturally to the treatment of sensibility, sensation and perception, impulse as phases of a single movement and with constant reference to their physical basis. Next, the growth of physical and mental functions should be traced in emotion, memory and association, character. After this would follow a similar treatment of organic development into its free creative forms as ideals, imagination and reason, volition. Such a treatment would naturally lead to a general unification, first, on the side of principle, and second, on the side of concrete content. The first would emerge in the examination of belief as the unification of interest, attention and desire, as also of its elaboration in complexity, range and freedom through the development of psychic activity into ultimate creative

form. The second would emerge, on the one hand, in the study of the problem of space-perception as unifying our conceptions of the object in experience, and, on the other hand, in that of time-perception as unifying our conceptions of the subject in experience. Finally, our entire study should unify itself in the thorough investigation of the self as it manifests itself through the various stages of organic development.

Thus pedagogical and theoretical interests alike emphasize the necessity for a more complete organization of psychology than is found at present. The central principle of such organization must be biological. Its application must be natural and organic. Psychological treatises must refuse even formal recognition of pre-scientific divisions and must adopt such an order as conduces best to the exhibition of that development upon whose actuality they insist. By such procedure we may hope that in the future psychologies may be enabled to reflect in their structure and movement the organic unity of the life which they describe.¹

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¹ The MS. of this article was received December 13, 1905. — ED.

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